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ABSTRACT

A qualitative study determined which factors in the museum exhibit environment or within the museum visitor may influence the visitor to attend an exhibit. Observations and interviews were conducted of 14 groups that visited a Chesapeake & Ohio steam locomotive at the Henry Ford Museum in Dearborn, Michigan. An inductive or grounded theory approach was used to analyze the data. Interest and relevance were motivational prerequisites for attention and influenced the visitor to attend the exhibit. The interest and relevance factors within the visitor could be categorized as enduring personal interest, curiosity, and connections to personal history. Group influence and the interesting nature of the exhibit, both external to the visitor, also influenced visitor attention. These findings provided some evidence to support the hypothesis that the attention model for museum exhibits is a plausible explanation about how visitors pay attention in a museum. The attention model was a viable replacement for the "hook" in the Csikszentmihalyi and Hermanson model. It was able to describe the visits of specialized groups and the visits of a more general family/social group. People visiting the locomotive exhibit did not attend in the same way but the model had the flexibility and power to describe motivation to attention in each case. (Appendixes contain 37 references, 10 notes, and instruments.) (YLB)

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An Attention Model for Museum Exhibits

By

John W. Lightner

A PRACTICUM REPORT

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Counseling, Educational Psychology
and Special Education

1998

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ABSTRACT

AN ATTENTION MODEL FOR MUSEUM EXHIBITS

By

John W. Lightner

Human attention and its motivational prerequisites have received a great deal of scrutiny in formal education but have not been the subject of comprehensive research in informal learning settings, such as museums. Researchers confuse the use of terms such as attention, interest, and curiosity; these terms seem to be used interchangeably, or at least imprecisely. Based on research in varied fields such as attention, interest, relevance, and reading, I formed a theoretical model for use in informal learning settings which I call, *The Attention Model for Museum Exhibits*.

The purpose of this qualitative study was to determine which factors in the museum exhibit environment or within the museum visitor may influence the visitor to attend to an exhibit. I observed and interviewed fourteen groups that visited the Chesapeake & Ohio steam locomotive #1601, the Allegheny, at the Henry Ford Museum in Dearborn, MI. I used an inductive or grounded theory approach to analyze the data.

Interest and relevance are motivational prerequisites for attention and influence the visitor to attend to the exhibit. The interest and relevance factors within the visitor are divided into Enduring Personal Interest, Curiosity, and Connections to Personal History. Group Influence and the interestingness of the exhibit, both external to the visitor, also influenced visitor attention.

The Attention Model as proposed and refined by this study may be a viable theoretical tool in describing motivation in informal settings. Further research will be necessary to verify the utility of the model. The Attention Model for Museum Exhibits has potential for guiding practice as well as further inquiry.

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John W. Lightner

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The visitors to Henry Ford Museum who participated in this study, for taking time from their visit to help advance our knowledge about motivation and attention in informal learning settings.

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CHAPTER I

INTRODUCTION TO THE STUDY

ATTENTION

Learning is a natural activity for the human species that begins at birth, or before, and continues throughout life. Educators depend on this natural human propensity in order to assist learners in achieving learning goals that are considered important to our society. But whether learning occurs in formal institutions, such as schools; in less formal settings, such as museums; or just as a part of daily life; the human organism must expend some level of its psychic resources on the objects of learning. This expenditure of psychic resources is called *attention* and is considered a prerequisite for learning.

Such expenditures of attentional resources come at a cost, however, since attentional resources are limited. An individual must conserve these limited attentional resources and will, therefore, choose to expend them on stimuli that he or she considers meaningful. Educators are concerned about this discretionary expenditure of attention and seek to better understand what conditions in the environment and which processes within the individual result in attention.

Both psychologists and educators agree that motivational factors are key to attention, and that motivation may be either extrinsic or intrinsic. Educators often rely on extrinsic rewards, such as a good score on a test, or intrinsic rewards, such as an individual's goal-setting behavior, to motivate an individual to expend attentional resources on learning outcomes considered important to society.

Educators who rely on an individual's motivation to achieve socially valued learning outcomes work in one of two types of institutions. These institutions are characterized by their learning environment, formal or informal. The formal environment, best represented by the school, is considered more controllable. That is, attendance is mandatory, graduation is necessary for many jobs, and schools have the mandate of society to assist students to achieve minimum learning goals. The informal institution, which may be represented by museums and similar cultural institutions, does not enjoy the level of control over learners that is characteristic of the formal institution. Instead, the informal learning institution depends on the individual's choice to visit the institution, confers no degrees, and carries no formal mandate from society to achieve minimum learning outcomes for every member of society. The informal institution depends solely upon individual learning needs and, therefore, upon the motivation of individual learners who freely choose to visit and, ultimately, attain any of the institution's learning goals.

STATEMENT OF THE PROBLEM

Although much is known about motivation in the formal learning setting, much less is known about the motivational factors affecting attention in the informal setting. Museum professionals, including curators and educators, all hold personal opinions concerning motivation and attention in a particular exhibit within their institution; however, little systematic research has been conducted to verify these 'hunches.' Even less evidence exists that permits these phenomena to be connected to theory. The larger unanswered question is: Exactly which factors in the exhibit environment or within the visitor result in the visitor expending attention on the exhibit?

If exhibit designers are to employ sound instructional design techniques when they develop museum exhibits they must identify the motivational factors leading to attention. Without this knowledge of the environmental and psychological factors affecting visitor attention, even the most carefully constructed and adequately financed exhibits will fail to achieve the learning goals envisioned for them. A first step is to identify and verify the motivational factors leading to visitor attention.

PURPOSE AND OVERVIEW OF THE STUDY

The purpose of this study was to develop and empirically verify an Attention Model for Museum Exhibits. I tapped literature from the fields of interest research, instructional design, cognitive psychology, and motivation in order to develop a model to guide the research. I refined the model based on the information obtained during the course of the empirical study.

I conducted this empirical work in the transportation section of the Henry Ford Museum in Dearborn, Michigan. Specifically, I interviewed fourteen visiting groups after they had visited the Chesapeake and Ohio #1601, a large super-power steam locomotive. These qualitative interviews formed the basis for verification and refinement of the Attention Model.

RESEARCH QUESTIONS

At the outset of the study I asked this question: **Which factors in the exhibit environment or within the visitor result in attention being expended on the exhibit?** The specific questions which arose from this overarching question were:

1. What role does the **enduring personal interest** of the visitor play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?

2. What role does the visitor's **curiosity** play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?
3. What role does the exhibit's **connections to personal history** play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?
4. What role does **group influence** play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?
5. What role does the **interestingness** of the exhibit play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?

These questions, along with the review of the literature, guided my development of an interview guide to use when talking with visitors. This interview guide changed, however, due to the inductive approach taken in this study: early results had a dynamic effect on the instrument. I modified the original guide (reproduced in Appendix A) because: 1) The questions did not 'feel' right. That is, they seemed awkward and the conversation didn't flow well from question to question. 2) Some of the questions seemed to be more appropriate as follow-ups to other questions. 3) The guide itself was not easy to use. It was not easy to navigate visually during the interviews. Also, the fact that it occupied more than a single page seemed awkward; it could potentially send a message to the interviewees that the conversation might take longer than they had originally thought, thus affecting their responses to the latter questions. See Appendix B for the revised guide.

RESEARCHER'S PERSPECTIVE

In this, as in any study using qualitative methods, the researcher becomes the primary data-gathering instrument. The reader may refer to Chapter III, "Methodology," for a detailed description of the procedures used in the field work and the data analysis for this study. In this section, however, I will give a brief description of my own perspective that may be of assistance

to the reader in determining the strengths and weaknesses inherent in the data collection and analysis. I will take a step back from this study to ruminate on my perspective:

> "My own background is firmly embedded in formal education. I pursued two undergraduate degrees: one in a civil engineering discipline and the other in technical education, having the intention to teach my civil engineering specialty at the post-secondary level at some future date. Upon graduation I accepted employment with firms that engaged in the practice of civil engineering. During twelve years in such employment, I was also an adjunct faculty member at a community college, teaching others how to do what I did every day.
>
> "In 1985 I was successful in obtaining a full-time position at a community college; this position was in the media technology area, which was a secondary specialty of mine involving both course work and professional experience. After securing such employment, I decided that I and my students would be better served if I obtained additional education. I received both an M.S. and an M.A. in two areas of educational specialty. Thus, I made the decision to position myself as an educator rather than pursuing additional training in either of my disciplinary specialties. I segued from the second master's into the Ph.D. program in Educational Psychology. And, hence, to research such as that which I am reporting here.
>
> "I have also maintained a longstanding interest in railroads and railroad technology over the years. This attachment probably grew from my childhood experiences, as I lived in a small town that was served by two railroads that crossed at grade. My parents gave me model trains as Christmas gifts while I was still quite small and I have many memories of stories told by the older men who worked for and around the railroad. The railroad seemed to be a part of daily life for me while growing up.
>
> "My interests in railroading have matured over the years and railroad history and historic railroad technology have become subjects that I want to learn more about and be influential in helping others to learn about as well. I have been a member of the Michigan State Trust for Railway Preservation since 1989, where we own, maintain, and operate a historic steam locomotive--the Pere Marquette #1225, a 1941 super-power Berkshire type steam locomotive built by the Lima Locomotive Works in Lima, OH. I work in the areas of locomotive inspection, maintenance, and as a fireman.
>
> "Recently I have also become associated with the Huckleberry Railroad in Flint, MI. The Huckleberry is owned by the Genesee Parks and Recreation Commission and operates in conjunction with Crossroads Village, an historic 19th century village. I began in locomotive and rolling stock maintenance, worked up to locomotive fireman, and have since qualified as locomotive engineer. The railroad operates over 9 miles of track and runs several daily trips during the summer season, a Ghost Train schedule during October, and Christmas Trains beginning Thanksgiving weekend and running through December 30.
>
> "Throughout this involvement with historic railroad equipment, I have become extremely interested in a construct that I've come to call the *Informal Learner* and the

associated concept of *Intrinsic Motivation*. Specifically, I am interested in how independent learners go about learning 'things' of their own choosing through informal learning institutions. Such interests have led me to museums as a place to study these constructs in informal education and learning. I believe, however, that such studies have much to say to formal post-secondary education in an environment where institutions are beginning to make provisions for non-traditional learners through such initiatives as virtual college and other student-centered enterprises. I believe that the independent learners who choose alternate routes to accomplish their learning goals will exhibit many of the characteristics associated with the construct of *informal learner*.

"Despite my personal interests in locomotives and railroads, I do not take a position that everyone should hold any such interests. Each person must find their own area(s) of interest. It is my opinion, however, that the motivational constructs will be similar, if not identical.

"My choice to study visitors to a locomotive exhibit was fueled by my own desire to study attention directed toward a familiar object and by the thought that my own knowledge of the exhibit would better position me to understand visitors' comments in context." --jwl

This section on my own perspective may provide an additional vantage point for the reader. My own attention to locomotives and railroad history definitely originated from three of the elements of the attention model under study here: Enduring Personal Interest, Curiosity, and Connections to Personal History. My interest in undertaking this study was to see if others exhibited a similar dynamic and to take these phenomena past mere 'hunches' by conducting a systematic investigation.

RATIONALE AND SIGNIFICANCE

This study was designed to contribute to the fields of lifelong learning, educational psychology, and museum education. Practitioners in each of these areas share an interest in motivation leading to the expenditure of attention and the readiness for learning that attention signifies. The findings of this study will contribute to these fields by providing a refined Attention Model for Museum exhibits to guide current practice and future research.

Scholars in the fields just mentioned are all interested in human learning and the requisite conditions that make such learning possible. To date, there has not been any systematic research conducted in informal learning environments, such as museums, to validate the prerequisites of attention and move such findings closer to a connection with theory. This study launches a program that will make contributions to the practice of museum education and connections to theory.

This study was conducted in a unique environment, one that contained a fascinating technological artifact that has a solid connection to American history and culture. However, the Attention Model may be adaptable to all museum exhibits and, I would suggest, to informal learning in general. The model encompasses the motivational dynamics of most human encounters with objects and phenomena.

STUDY CONTEXT AND METHODS

The context for this study was a museum of American history and technology. I chose a specific exhibit, the Chesapeake and Ohio locomotive #1601, at which to conduct the study (See Appendix G, Photo 1 and Drawing 1). This locomotive is a part of the larger railroad exhibit within the transportation section of Henry Ford Museum in Dearborn, MI. The Ford Museum is in turn a part of the larger Edison Institute that also includes Greenfield Village, an outdoor museum that includes many historic homes and buildings that have been moved to the site.

The #1601 is located within the Great Hall of the museum. There are 12 acres of exhibit space in this Hall. Other display areas in the Hall are: Communication, Lighting, Agriculture, Home Arts, as well as major exhibits such as, "Made in America" and "Henry's Story." There is

also an "Innovation Station" and a hands-on area. The transportation section in which the locomotive is located also includes carriages, trucks, Presidential vehicles, and a major exhibit called, "Automobile in American Life." Attached to the Great Hall is the front of the museum, the facade of which is a copy of Independence Hall, but much larger. In this area are exhibits on silver and pewter, clocks, jewelry, ceramics, and glassware. There is also a major exhibit called, "The Motown Sound: The Music and the Story." The remaining public spaces within the museum are a theater, museum store, and cafe.

My subjects for the study were fourteen groups who visited the C&O #1601 on the days that I spent on the floor of the exhibit during the month of March. I first observed these groups as they worked their way through the exhibit to see if they displayed any behaviors that would indicate their expenditure of attention on the locomotive. After I observed them displaying behaviors indicative of attention, I approached them to explain what I was doing and ask their permission to engage in a short conversation about their visit to the locomotive.

The methods for this study are drawn from the qualitative tradition. Field notes and conversations with subjects are the data. The researcher was the data collection instrument.

ANALYSIS

I used an inductive or grounded theory approach for the analysis of the data. Management of the data during the analysis phase was facilitated by the use of the QSR NUD*IST®[1] qualitative data analysis software.

I extracted patterns and trends as well as connections to the Attention Model from the coding and analysis. I report research findings according to the major themes that emerged from

the analysis and their connections to the Attention Model; I refined the Model on the basis of the analysis. I provide a more detailed description of the methods in Chapter III, "Methodology."

SCOPE AND LIMITATIONS

The scope and limitations of this study result from the choice of method, setting, and informants. There are at least four limitations: 1) The sample was not randomly chosen. Instead, groups exhibiting attention-like behaviors were asked to consent to a conversation about their visit. 2) The results of the study can not be tested for statistical significance. 3) This was a one-shot study. I did not ask my informants to provide me with names and contact information, negating my opportunity for follow-up on areas that might benefit from clarification after the fact. And, 4) I spent a very short period of time talking with each group of people. These informants had paid admission to the museum and were there to get their money's worth. I spent from 5 to 10 minutes with each group, on average. This study used a qualitative approach in order to verify categories and generate hypotheses about attentional dynamics in order to form a base for future research and discussion. Each of the limitations--method, setting, and informants-- will be briefly discussed.

Limitations from Method

Qualitative studies, like their quantitative counterparts, have strengths and weaknesses. One of those weaknesses is the inability to generalize to a population using sampling and probability theory. In fact, in this study I chose to go one step further in limiting generalizability by not randomly sampling at all. But what is given up in making this choice, foregoing statistical sampling for generalizability, is offset by the theory building power derived from theoretical

sampling (Glasser & Strauss, 1967), where the theory emerges from the ongoing cycles of data collection and analysis, and by analytic generalization (Firestone, 1993), where one generalizes to theory, uses theory to make predictions, and confirms those predictions.

The choice to forego sampling was made on the basis that the thrust of this study was to determine what people who were demonstrating attention-like behaviors were thinking and what motivators might be at work. It was, therefore, essential to choose people who were paying attention in order to investigate those factors. Although the sample could have been randomly selected from groups paying attention, there seemed to be nothing to be gained by doing so.

A further limitation was the inability to follow-up after the initial conversation. It is most useful in a qualitative study such as this one to be able to contact the informants during the analysis phase to clarify a point or to verify the researcher's emerging conclusions. Questions arise after the fact that can only be adequately answered by querying the informants themselves. I purposely chose not to make provisions for follow-up due to the preliminary nature of this study.

The final limitation of method was the short time spent with each group. I spent varied times with each group. I gauged the time spent with the groups based on the clues I perceived during the interview concerning the group's apparent desire, or not, to move along to the next exhibit. Although the information obtained was adequate for the purposes of this study, additional insight may have come from extended conversation.

Limitations from Setting and Informants

The choice of setting was also a compromise that has the potential to impose limitations. All interviews were conducted near the #1601 on the museum floor. The strength of this

approach is that the visit had just concluded for the group when our conversation began and the informants were still within the exhibit environment, allowing them to glance back at the locomotive and providing them with a sense that they could continue their visit to the other exhibits in the museum by merely stepping away from the interview and being on their way.

There was, however, the temptation for the group to want to step away prematurely. The ease of stepping away from the conversation to move along to the next exhibit may well explain the shortness of a few of the conversations. Another weakness was the overall noise level from other areas of this 12 acre hall. This noise level had the potential to interfere with informants' concentration as they provided their information.

The reader may refer to Chapter IV, "The Participants and Setting" for additional information that may assist in determining strengths and limitations of the study. The foregoing is provided as a preview and to help set the stage.

SUMMARY AND OVERVIEW OF THE STUDY

This chapter introduced the concept of attention. Also introduced here was the concept of informal environments, particularly those within museums. The question was posed, "Which factors in the exhibit environment or within the visitor result in attention being expended on the exhibit?" This question represents the gap in our knowledge about motivation and attention in museum exhibits. The research questions, researcher's perspective, rationale for and significance of the study , study context and methods, and scope and limitations were also introduced.

In *Chapter II*, I present a "Review of the Literature" in order to establish the origins for the research questions. Chapter II will also describe the construction of the Attention Model for Museum Exhibits that I built from the literature to provide the basis for this study.

In *Chapter III*, "Methodology," I discuss the methods used in this study. Also, I present a brief description of the research site and sample as well as more information on data collection procedures.

In *Chapter IV*, "Research Findings," I explain the patterns and trends extracted from the information provided by the conversations with the informants. This is presented in two parts: 1) A description of the emerging themes from each group and, 2) The flow through the Attention Model exhibited by each group.

I present "Conclusions and Discussion" in *Chapter V*. I include a review of the major conclusions and hypotheses based on my interpretation of the data. These conclusions and hypotheses may become the basis for future research and discussion.

CHAPTER II

REVIEW OF THE LITERATURE

INTRODUCTION

The purpose of this study is to describe the factors in the exhibit environment or within the visitor that result in attention. I review literature from the areas of attention, interest, and relevance. I also develop an Attention Model for Museum Exhibits from this literature.

Schunk (1996), Gagné (1985), and Keele (1973) consider attention a prerequisite for learning. Information processing theorists in particular focus on how people attend to environmental events and are concerned with the sequence and execution of the cognitive events related to attention. This study looks at the events that precede attending behaviors in the museum context. These events may be considered motivators to attention.

Many writers use the term attention and some of its prerequisites, such as interest, somewhat loosely and interchangeably. This review will develop clear distinctions between these terms by calling for a strict use of these technical words. I build the attention model based upon those distinctions.

DEVELOPMENT OF AN ATTENTION MODEL

This project began with my dissatisfaction with a model developed by Csikszentmihalyi and Hermanson (1995) that purported to describe the process of intrinsic motivation. See Figure 1 for a reproduction of that model. Although the text of their article, "Intrinsic Motivation in Museums: Why Does One Want to Learn?" provided a very satisfactory explanation of interest

as being one of two types, situational interest and personal interest, it failed to adequately explicate the 'hook' shown in their figure. That is, the theoretical background did not appear in the model. I intend to fill that void by expanding upon Csikszentmihalyi and Hermanson's theoretical background by developing an Attention Model for Museum Exhibits from the literature reviewed in this chapter. This model will be used as the basis for this study.

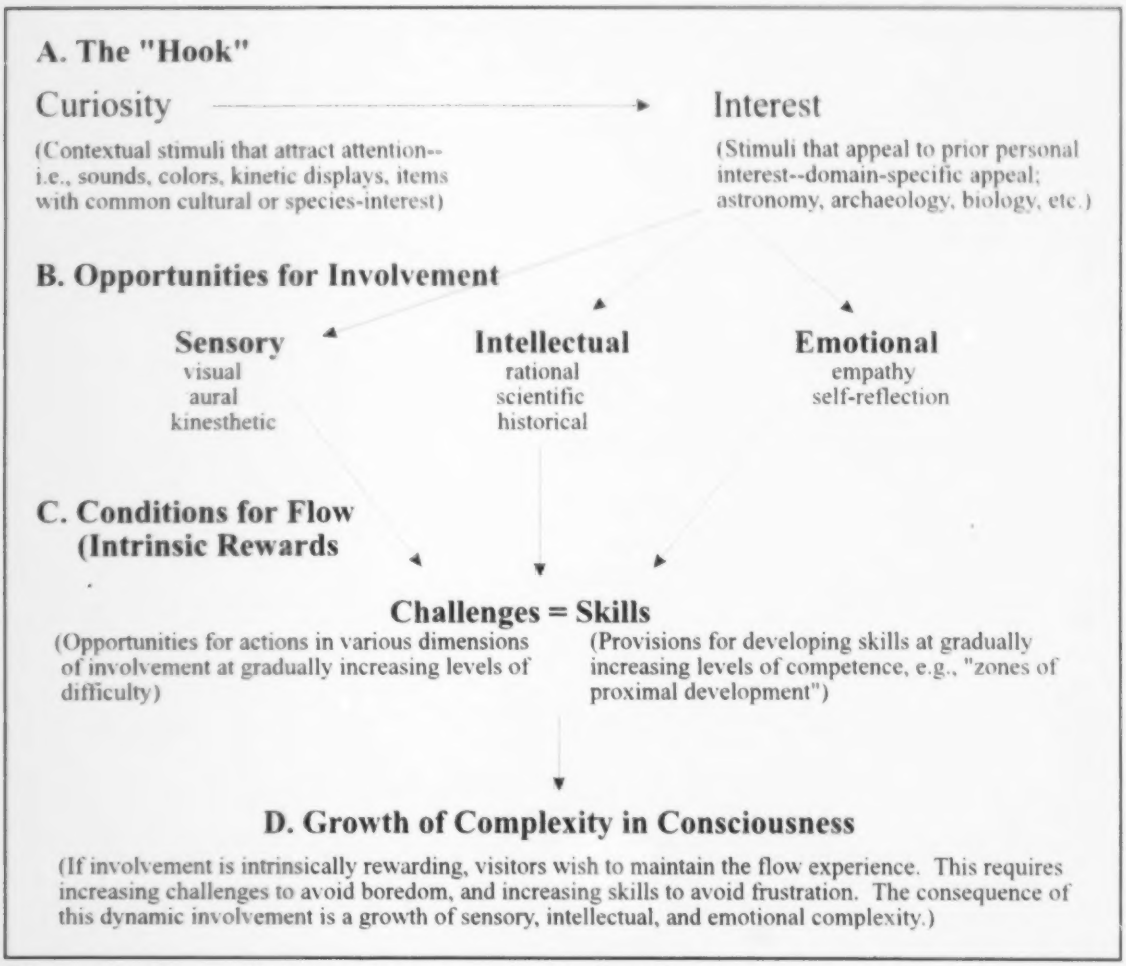
A. The "Hook"
Curiosity
(Contextual stimuli that attract attention--i.e., sounds, colors, kinetic displays, items with common cultural or species-interest)
Interest
(Stimuli that appeal to prior personal interest--domain-specific appeal; astronomy, archaeology, biology, etc.)
B. Opportunities for Involvement
Sensory
visual
aural
kinesthetic
Intellectual
rational
scientific
historical
Emotional
empathy
self-reflection
C. Conditions for Flow (Intrinsic Rewards
Challenges = Skills
(Opportunities for actions in various dimensions of involvement at gradually increasing levels of difficulty)
(Provisions for developing skills at gradually increasing levels of competence, e.g., "zones of proximal development")
D. Growth of Complexity in Consciousness
(If involvement is intrinsically rewarding, visitors wish to maintain the flow experience. This requires increasing challenges to avoid boredom, and increasing skills to avoid frustration. The consequence of this dynamic involvement is a growth of sensory, intellectual, and emotional complexity.)

Figure 1 Csikszentmihalyi and Hermanson Motivation Model
(Adapted from Csikszentmihalyi & Hermanson, 1995)

Interest and Relevance

Many researchers consider interest to be a phenomena that emerges from an individual's interaction with their environment. Krapp, Hidi, and Renninger (1992) divide interest ensuing from person-environment interaction into *Individual Interest* and *Situational Interest*. Individual interest is specific to the individual, relatively stable, associated with increased knowledge, positive emotions, and increased reference value (Krapp, Hidi, & Renninger, 1992, p. 6). Situational interest, on the other hand, emphasizes the role of the environment and is generated by stimulus characteristics, is most generally evoked suddenly by an event in the environment, tends to be short lived, but may have a more permanent effect that could lead to the emergence of individual interest. Csikszentmihalyi and Hermanson (1995) use *Curiosity* to refer to situational interest and *Interest* to refer to individual interest (See Figure 1).

Csikszentmihalyi and Hermanson conceptualize the dynamics of interest as moving from curiosity to interest. They state, "After the individual's curiosity is aroused, the exhibit must engage sustained interest in order for learning to take place" (p. 73). But sustained interest need not necessarily begin with curiosity. The visitor who has an individual interest in the subject matter of a particular exhibit will be interested in it without requiring some novel stimuli to generate curiosity. Instead the individual with an enduring personal interest will automatically seek out specific exhibits that correspond to that interest. Thus, enduring personal interest is a viable 'hook' for the visitor with a stable personal interest.

Curiosity, on the other hand, is a phenomena that could appeal to the individual who has yet to develop an enduring interest in the subject matter of a particular exhibit. Berlyne's (1963) collative motivation best describes the stimuli that could elicit curiosity. His collative variables

include: novelty, surprisingness, change, ambiguity, incongruity, blurredness, and power to induce uncertainty (p. 290). Motivation based on collative variables is a function of the biological drive of humans to explore and understand their environment. The variable in the person-environment system becomes the exhibit environment, where something novel or out of the ordinary confronts the visitor. Curiosity is relatively stable across the population of human beings, that is, most human beings would exhibit curiosity in response to the unique stimulus. It could also be argued that curiosity is affected by the values of the society, thus further refining the idea of 'population' to those groups that share a common heritage and, therefore, find similar things curious.

Curiosity is what Hidi (1990) calls situational interest. With situational interest, the emphasis is not on individual differences, but on commonalities; most individuals in the population exhibit curiosity when presented with novel stimuli. Maw and Maw (1968) define curiosity in terms of the behaviors thought to be indicative of curiosity:

> "1. reacts positively to new, strange, incongruous, or mysterious elements in his environment by moving toward them, by exploring them, or by manipulating them, 2. exhibits a need or a desire to know more about himself and/or his environment, 3. scans his surroundings seeking new experiences, and/or 4. persists in examining and exploring stimuli in order to know more about them" (p.462).

Curiosity, then, reflects the human desire to know more about one's environment--the desire to learn.

Thus, two components of interest emerge from this discussion. On the one hand there is the enduring personal interest that is a stable characteristic of the individual. On the other hand there is the phenomena of curiosity that is a common attribute of the population. For the

purposes of this study, therefore, interest will be considered to be either *enduring personal interest* or *curiosity*.

The relevance of the exhibit to the visitor's personal background is not discussed by Csikszentmihalyi and Hermanson but deserves consideration in a discussion of intrinsic motivation. True, an exhibit is relevant to the visitor with an enduring personal interest in the subject matter of that exhibit, but there are additional relevance factors that could work as the 'hook' to draw visitors to a particular exhibit. Keller (1979, 1983, 1987) defines relevance as, ". . . sustained motivation [that] requires the learner to perceive that *important personal needs* are being met by the learning situation [emphasis in the original]" (Keller, 1983, p. 406). Examples of important personal needs in the museum may include being connected to one's own personal history and to one's visiting group.

The interest-plus-relevance distinction comes from the work of John Keller. Keller's ARCS Model (November/December, 1987) of instructional design includes the elements of Attention, Relevance, Confidence, and Satisfaction. Keller posits that any instructional unit must include these elements if motivation to learn is to occur. But the reader will immediately notice that the first two elements of ARCS are Attention and Relevance, not Interest and Relevance.

In Keller's earlier work (1983), the model was Interest, Relevance, Expectancy, and Satisfaction; certainly not as memorable as the ARCS acronym, but the interest component is in its proper place as a prerequisite for attention. He equates interest, however, with curiosity, so even here Keller falls victim to the muddled distinction between attention, as an outcome, and its prerequisites; a common trap that is so prevalent in the literature.

I have been building a case for the use of *Interest* and *Relevance* as viable replacements for the curiosity-to-interest description of Csikszentmihalyi and Hermanson's 'hook' in Figure 1. Figure 2 illustrates the motivational roles of interest and relevance. Attention is not directed toward the exhibit until it has 'connected' with the individual through either interest or relevance. From an information processing point of view, interest and relevance are two motivational mechanisms that help the individual select among several competing inputs for his or her attention (Schunk, 1996).

Interest and relevance appear to be viable mechanisms for a visitor to make connections to a museum exhibit. Either of these connections, taken alone, could result in the visitor direction his/her attention toward the exhibit.

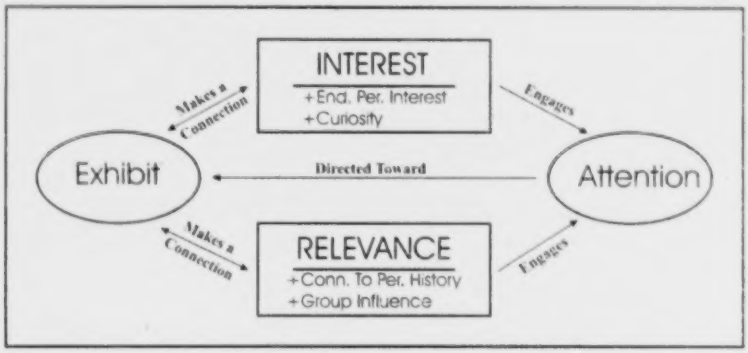

Figure 2 Motivational Roles of Interest and Relevance

Attention

Attention is a critical prerequisite for learning whether the setting is the formal classroom or the informal learning environment found in a museum exhibit. Attention is the outcome for which interest and relevance are plausible predictors. Koran and Koran (1983) state that attention is a critical factor in visitor learning and that, to be effective, the exhibit must ". . .

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attract visitor attention, maintain that attention, and provide useful information" (p. 14). This study concerns itself with the first level, that of attracting visitor attention.

James (1890/1950) contends that attention ". . . is the taking of possession by [better, 'of'] the mind, in clear and vivid form, of [better, 'by'] one out of what seem several simultaneously possible objects or trains of thought . . . it implies withdrawal from some things in order to deal effectively with others" (p. 403-404). In discussing selective interest he says:

> "Millions of items of the outward order are present to my senses which never properly enter into my experience. Why? Because they have no *interest* to me. *My experience is what I agree to attend to*. Only those items which I *notice* shape my mind--without selective interest experience is utter chaos . . . It varies in every creature but without it the consciousness of every creature would be a gray chaotic indiscriminateness, impossible for us even to conceive [italics in the original]" (James, 1890/1950, p. 402).

From an information processing perspective attention would be described as a limited human resource. Museum professionals need a firm understanding of the motivational prerequisites to attention if they expect their visitors to budget scarce attentional resources on a particular exhibit Attention, then, is the outcome of the Attention Model.

The Attention Model for Museum Exhibits

The proposed Attention Model for Museum Exhibits is shown here as Figure 3. The museum visitor is represented by the dashed circle in the model. The psychological attributes of interest and relevance that reside within the visitor are shown inside the dashed circle while the external relevance factor of group influence is shown outside the circle. Interest is depicted as being either Enduring Personal Interest or Curiosity while relevance is depicted as Connections to Personal History or Group Influence[2]. Connections to the exhibit are shown by the dashed lines with arrowheads (paths #1, #2, & #3, in Figure 3). That is, the visitor may connect to the

exhibit through Enduring Personal Interest, Connections to Personal History, or Curiosity. The possible psychological interactivity between interest and relevance components is depicted by the solid lines with arrowheads inside the circle.

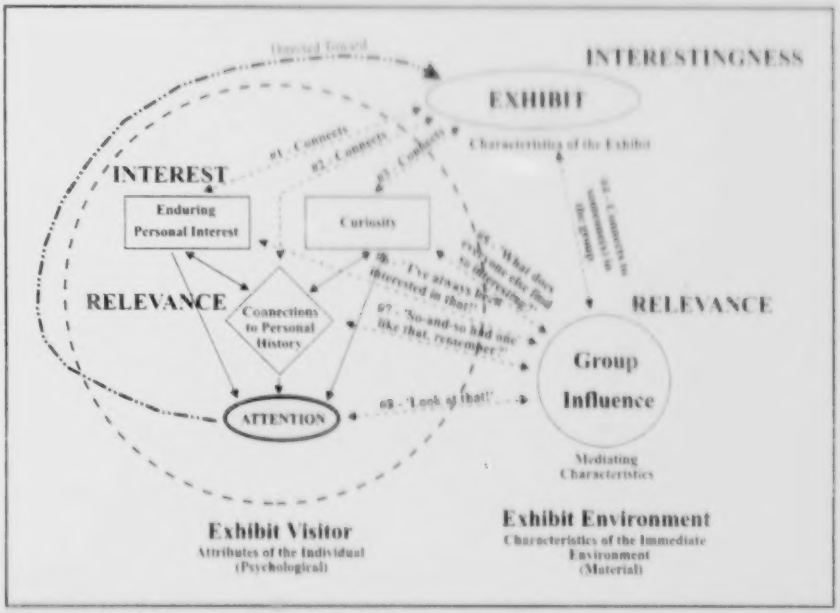

Figure 3 Attention Model for Museum Exhibits

Group influence constitutes another possible relevance factor. Individuals who are members of a visiting group influence other group members in a variety of ways. Diamond (1986) talks about reciprocal influence of group members, where interactions with the exhibit are effected by interactions with other group members. Sterry (1996) characterizes visitors as active participants who recognize a connection with their own history through personal experience and recollection, resulting in a sense of the group's own history and identity (p. 131). Dierking and Falk (1994), in a review of family behavior and learning research, give support to Sterry's position that visitors--especially adults--attempt to relate information to their prior knowledge and experience. Dierking and Falk also spend some time talking about group agendas. They say,

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"Visitor 'agendas' are shaped by a variety of factors including prior knowledge and experience with the content of the informal science setting, motivation, and interest and can result in a variety of expectations. . ." (p. 61).

For the purposes of this study I conceive of group influence as being initiated when one, or more, individual(s) within the group connect(s) to the exhibit (path #4 in Figure 3) and influence another group member (paths #5, #6, #7, & #8 in Figure 3) to attend to the exhibit. The group member being influenced by his/her peers might simply be curious about what others find interesting, be reminded of a shared connection to personal history, or simply be directed to look at the exhibit by another group member. The possible result is that the influenced individual will be motivated to pay attention to the exhibit by the activities of the group.

The interest and relevance factors from Figure 3 are further described in Table 1:

INTEREST	A pre-disposing factor that determines whether an individual will be likely to begin the process of focusing psychic energy resources on a given stimulus.
Enduring Personal Interest	An already developed idiosyncratic propensity to expend attention on specific objects, read about them, engage in hobbies involving them, etc. This category includes the kinds of interests that our friends would list if they were describing us to someone else. Personal traits controls the process of attention.
Curiosity	Attributes of the object that make it attractive to a broad group of individuals, e.g., size, romanticized place in history, etc. As it relates to the individual, this category represents a trait that is a bit more universal in the population; there is some variance among individuals, but some people are inherently more curious than others.
RELEVANCE	A connection to the visitor made on the affective level. This could be an emotional, romanticized, or personal connection.
Relation to Personal History	A personal or family involvement with the object or class of objects that makes the 'romance' more personal through a modification of the individual's personal culture. This category describes the connections made with the individual's past.
Group Influence	The object becomes attractive due to the aggregate inter-personal interests, curiosity, and memories of a visiting group. In one sense the group represents an individual and the members of the group parts of the community 'mind'.

Table 1 Definition of the Interest and Relevance Characteristics of the Attention Model in Figure 3.

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One factor not yet introduced is the *Interestingness* of the exhibit itself. Krapp, Hidi, and Renninger (1992) refer to the "conditions that elicit interest" (p. 8) as interestingness. This focus moves us from the human environment to the physical environment. Certain objects naturally tend to be more interesting than others. This additional interest could be due to their sublimity (Nye, 1990, 1994) or some other intrinsic characteristic of the object. An object's interestingness is based on a general propensity within the population to be intrigued by these objects. Interestingness is the environmental side of the person-environment coin, may relate to the visitor's curiosity, but may also appeal to something within the individual that goes beyond mere curiosity--more of an expression of awe, wonder, or reverence..

It could be argued, therefore, that interestingness is really a characteristic of the individual. But it could also be argued that there are objects whose interestingness is specific to a certain cultural or social group, implying that the cultural or social group exerts the influence resulting in a general propensity among the populace to consider such objects interesting. The argument does, however, raise the issue of whether certain museum exhibits are more popular due to this attribute of interestingness. It must be remembered, however, that interestingness, however conceived, interacts with visitor characteristics, specifically, curiosity.

How the Model Might Work

A visitor who became interested in locomotives by previous experience would come to the museum with an enduring personal interest in locomotives. Such a visitor would, therefore, have decided to come to a specific museum because of the locomotives in the collection or, if

not, the visitor would purposely seek out the locomotive exhibit once he or she learned that the museum had locomotives.

Curiosity, on the other hand, is not related to an enduring interest on the part of the visitor. Instead, curiosity is a more universal trait in the population and is triggered by situational factors. In the museum, a visitor who has no enduring personal interest in locomotives may become interested when a particularly novel locomotive exhibit is encountered, or, for that matter, such a visitor may view almost any locomotive exhibit as being novel. The visitor then attends in order to satisfy the curiosity elicited by the encounter.

Connections to personal history are idiosyncratic. Any given visitor may or may not have personal connections through family, family friends, or personal friends who have historical connections to the objects exhibited or to the historical context that they represent. For some visitors this connection will become known when they encounter the exhibit and will form the basis for attention, this is a direct connection. For others, connections to their personal history is mediated by their enduring personal interest or curiosity, thus, the connection is an indirect one.

An example of such a direct connection to personal history would be the case of a visitor to a locomotive exhibit who remembers, as a by-product of the encounter, that steam locomotives were still running on the tracks through their hometown when he or she was a child. The visitor might be moved to recall many childhood memories relating in some way to the trains. One such memory might be the ritual of going to the depot every afternoon with a group of friends to see the passenger train arrive. The visitor might remember seeing the loading and unloading baggage, recall mingling with passengers arriving and departing, reminisce that the station master

was their neighbor, etc. This rush of memories might result in attention being directed toward the locomotive in the exhibit.

Outside the dashed circle that represents the visitor is the visitor's immediate environment. This environment is limited, in this study, to the exhibit and the visitor's group. The exhibit has characteristics that make it interesting, and it thus appeals to the visitor's characteristics of enduring personal interest or curiosity. A connection is also possible as links are made to the visitor's personal history.

Another characteristic of the immediate environment, however, is the visiting group. Many visitors come to the museum as a member of a group and are influenced by others in the group. All it may take is for one group member to connect to the exhibit as described above and once that happens, that individual can influence others in the group, resulting in attention.

This group influence may occur in one of four ways (paths #5, #6, #7, & #8 in Figure 3). First, a member of a visiting group may have their curiosity aroused directly as he or she makes an attempt to discover what someone else finds so interesting. Second, someone in the group could express his or her own enduring personal interest in the artifact. Third, there may be a direct connection to the individual's personal history that is made apparent by someone in the group. And, last, the individual's attention may be directly focused on an object if another group member directs them to look at it or describes it.

To some extent, the individuals in the group act like members of a single body, in the same way that hands and feet are both members of the human body. One may be attracted by enduring personal interest and, thus, focus others' attention through curiosity, connections to personal history, or by focusing attention directly. One individual's connection may apply to the

entire group, resulting in the entire body moving as one toward the exhibit, and in the expenditure of attention by previously non-attending members.

ATTENTION RESEARCH

Museum studies to date have been predominately quantitative and focused on exhibit evaluation rather than theoretical research. Attention in museums has historically been studied in terms of the time visitors spend within an exhibit. Robinson (1928), in a classic study, *The Behavior of the Museum Visitor*, coined the term *Holding Power*. An exhibit having this power to hold the visitor's attention was, and still is, considered more successful than one that has little holding power. One of the most unobtrusive ways of measuring holding power is, of course, by simply observing the length of time a visitor stays at the exhibit. The exhibit with high holding power ostensibly has the visitor's meaningful attention for a longer time than does the exhibit with low holding power.

Time can be an easy and unobtrusive way of measuring attention and learning if a correlation can be verified between time spent at an exhibit and these outcomes. Falk (1983) used time and behavior as an attempt to assess cognitive learning. He used a pre- to post-test score to quantify the cognitive gain resulting from the time spent in the exhibit. Videotapes were used to time the visit and to categorize visitor's behaviors. Falk concluded that, ". . . the results provide a strong endorsement for developing an evaluation procedure based upon unobtrusive parameters such as time on task and observable nonverbal behavior" (p. 274).

Beverly Serrell (1997) has taken data from 108 exhibitions in order to study duration and allocation of visitors' time. She posits that the amount of time and number of stops are

systematic measures that can be indicators of learning (p. 108). Through the development of two indices, sweep rate and percentage of diligent visitors, Serrell finds that, "Visitors who spend relatively more time usually are the ones who stop at more elements and become engaged in more of what the exhibition has to offer . . . [and that] the pattern seems to be to spend more time by making more stops" (p. 121).

These studies, and the many others that use time as a measure of success, insist that time spent at an exhibit correlates with learning. These studies do not, however, address the kind of learning that results from time spent in a museum exhibit nor what creates the holding power. Is the outcome a cognitive one and, if so, does it correspond with the learning objectives of the exhibit design? Are we only interested in cognitive outcomes? Quite frankly, the museum community has not yet come to consensus on what outcomes equate to exhibit success or, for that matter, whether social, attitudinal, or psychomotor outcomes might be more appropriate outcomes (c.f. Laetsch et al., 1980).

Time spent with an exhibit does not, however, provide any explanation for the motivations behind attention. It is unfortunate that little has been done since Robinson's 1928 study to add to our knowledge of motivation to attend in museum exhibits. Instead, museum researchers have been seemingly enamored by this concept of measuring attention with a stopwatch. I would like to make an initial contribution toward filling this void through the results obtained through this study.

SUMMARY

This chapter has called upon the literature from the areas of attention, interest, and relevance to construct a model that can guide this study. Csikszentmihalyi and Hermanson posited a model for museum motivation, but that model did not explain the way the 'hook' operated, and although Keller offered great promise in proposing Interest and Relevance, he fell short in his understanding of interest, mistaking it for curiosity. Representative interest research from the field of reading was brought into play to fill this void. The Attention Model was developed from this eclectic mix of research traditions to form the basis for a more complete explanation of the Csikszentmihalyi and Hermanson 'hook.'

Traditional museum studies have been undertaken in order to provide formative or summative evaluations of specific exhibits. Also, these studies have used predominately quantitative methods until quite recently and, as such, have gravitated toward the use of time as a measure of attention. It appears, therefore, that a void exists in the museum studies literature that can begin to be filled by providing a better understanding of what motivates attention.

CHAPTER III

METHODOLOGY

INTRODUCTION

The literature on attention in museums is limited to measurement of time and observation of behaviors. Little is know about the events that precede a visitor's attention. Further, I could not develop the Attention Model using the museum literature alone. Instead I could only do so by reaching out to the literature on reading research.

A significant contribution can be made to the field of museum studies by developing a better understanding of which factors result in attention in a museum exhibit. This chapter describes the research site, sample, procedure used, and data coding and analysis for this study.

THE RESEARCH SITE

This study was designed to gather evidence for interest and relevance as motivators of attention. More specifically, I wanted to look at these constructs in an informal learning environment and a museum exhibit was chosen. I selected the Chesapeake and Ohio steam locomotive #1601 located in the transportation section of the Henry Ford Museum in Dearborn, Michigan.

This locomotive exhibit was chosen for two reasons. The first is the locomotive's inherent interestingness (Krapp, Hidi, and Renninger, 1992). And the second is the large number and variety of visitors to the Henry Ford Museum.

THE EXHIBIT

The Chesapeake and Ohio locomotive #1601 is a 'modern' steam locomotive. By modern it is meant that this locomotive was built late in the steam era and represents the highest level of mechanical engineering to be realized in the design and construction of steam locomotives. It also represents the scale of motive power needs voiced by the railroad companies in the 1940s.

Locomotive #1601 was built in December, 1941 by the Lima Locomotive Works in Lima, OH for the Chesapeake and Ohio Railroad. In the railroad's classification system the #1601 was an H-8 or Allegheny[3] type. Hence, it is often referred to as "The Allegheny." Using a 2-6-6-6[4] wheel arrangement (See Appendix G, Drawing 1), the Allegheny is an articulated locomotive, meaning that the frame, under the rigid boiler, could flex as the locomotive negotiated curves.

The locomotive weighs in at nearly 600 tons when its tender and boiler are full. It is 11' 1" wide, 16' 5-1/2" tall, and 125' 8" long. It is, in short, a huge locomotive and, according to David P. Morgan, editor of *Trains*, ". . . regarded in certain circles as the most perfectly engineered articulated ever built, bar none" (quoted in Huddleston & Dixon, Jr., 1996, p. 13).

Without doubt the Allegheny represents what Leo Marx (1964) had in mind when he coined the term *Technological Sublime*. Marx protégé David Nye recounts the origin of the term:

> "In nineteenth-century America certain machines began to receive the same kind of attention [as did objects within the aesthetic theory of the sublime]. Leo Marx has termed this response to displays of new railroads and steamboats as the 'technological sublime,' in which 'the awe and reverence once reserved for the Deity and later bestowed upon the visible landscape is directed toward technology, or rather the technological conquest of matter'" (1990, p. 59).

The Allegheny is a perfect example of this technological conquest of matter. This is so not only in its mere construction but in its ability to move tremendous quantities of freight,[5] conquering time and distance.

The awe, romance, and patriotism, typical of people's response to sublime objects, is expressed by Henry B. Comstock in an article in *Railroad*, as he compares the Allegheny (2-6-6-6) with the Union Pacific "Big Boys" (4-8-8-4):

> "'The last word in articulated power? [referring to the Union Pacific "Big Boys"]. Not quite.
>
> "Turn time ahead a few months from their date of delivery [UP Big Boys] to December 9th, 1941--two days after Pearl Harbor. Out in Lima, Ohio, an office car has just pulled in from Cleveland. Chesapeake and Ohio motive-power officials cross the cinder-ballasted nickel Plate yards, pick up their 'dog tags' at the gates of the Lima Locomotive Works, and cut through the sprawling erecting shop to the open test-track beyond.
>
> "Down where the rails curve to the right is another building, fresh with the smell of paint and dryer. They shove open the door and stop abruptly. The small builder's photo which each member of the party received with his identification card has given no hint of the spectacle within one hundred and twenty-eight feet of Appalachian tonnage mauler; a height from tire to smokestack rim of sixteen and one-half feet; twin sand domes with a combined capacity of eight tons of seashore; six pair of sixty-seven inch drivers and--that's right--a six wheel trailing truck. That extra axle wasn't put there for ornamentation. It had to be added to keep one hundred and thirty-five square feet of grate area below the level of the rear main wheel.
>
> "Even the men who have watched this engine take shape from a score of tracing paper layouts cannot conceal a certain degree of pleased amazement. They climb into the cab's green interior; look down the long barrel, rolled from steel plate that measures an inch and one-eighth in thickness; drop back to the ground to inspect the tender trucks--one six- and one eight-wheeled unit, for better absorption of weight.
>
> "Nobody doubts the word of D. S. Ellis, chief mechanical officer of the road, when he casually states that the 1600 will handle 5750 tons between Clifton Forge, Virginia, and Hinton, West Virginia, unassisted.
>
> "There is further talk of a tractive effort of 110,200 pounds and an engine weight [without tender and water] of three hundred and forty-eight tons. But it takes a veteran newspaper man named Joseph Doherty to sum up the thought that is uppermost in everybody's mind. Turning to Walter Jackson, originator of 'Chessie,' the cat, he shakes his head and says:
>
> "'When people have the will to build an engine like this, they're bound to win a war!'" (quoted in Huddleston & Dixon, Jr., 1996, p. 11-12).

The locomotive continues to make a similar impact on visitors from the 1990s, as this study will demonstrate.

The locomotive is positioned in a prominent place within the railroad exhibit. This exhibit is on the far right side of the building as visitors enter by the center entrance (See Figure

4). Upon arrival, visitors receive a brochure called, "Finding Your Way." This brochure includes a perspective floor plan with major objects shown; the Allegheny is shown on this perspective view. The locomotive is also listed in a section called, "Historic Objects You Must See!"

To Museum Store, American Cafe, & Greenfield Village
From Main Entrance and Presidential Vehicles
C & O
#1601 (Alleghney)
"The President"
To remainder of railroad exhibit

Figure 4 Allegheny Exhibit Area

As visitors move from the museum's main entrance to their right, they encounter the museum's collection of Presidential Vehicles. At the end of this display they come face-to-face with the Allegheny. Actually visitors have three choices at this point: 1) They can turn left and enter the railroad exhibit; 2) They can go straight and visit the carriages, which isn't a very clear choice since the carriages aren't visible; and 3) They can turn right to access the Museum Store, American Cafe, or go to Greenfield Village.

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The Visitors

Henry Ford Museum and Greenfield Village operate five program seasons: Winter, Spring, Summer, Autumn, and December. According to a 1990 study by Hood Associates [Marilyn "Molly" Hood], the visitors do show some variations in psychographics from season to season. See Table 2 for some examples of variations that might impact this study (Note: n = 2,095).

Characteristic	Winter	Spring	Summer	Autumn	December
First-time visitors to Museum	**23%**	42%	47%	37%	16%
Attended on weekday	**35%**	31%	43%	28%	50%
Attended on weekend	**65%**	69%	57%	72%	50%
Respondents lived in Detroit metro area	**53%**	32%	22%	35%	56%
Respondents lived outside Detroit metro area	**43%**	63%	76%	64%	43%
Males	**55%**	56%	50%	55%	50%
Females	**43%**	44%	49%	45%	50%
Companion on visit to Henry Ford Museum/Greenfield Village on survey date:					
Family	**58%**	52%	64%	55%	57%
Friends	**21%**	15%	12%	16%	17%
Family and friends	**4%**	8%	6%	7%	12%
Came alone	**14%**	12%	7%	12%	10%
Organized group, other	**2%**	14%	10%	10%	4%

Table 2 Representative Audience Characteristics (Hood Associates study, August 1991)

I highlighted the winter column to represent the season in which I conducted this study. Note that 65% of the winter visitors attend on weekends and that 58% of the winter visitors are family

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groups. My study was conducted on the weekend and encountered predominately family groups. In the autumn, visitors are even more likely to visit during the weekend (72%) and almost as likely to be family groups (55%). In fact, visitors to Henry Ford Museum and Greenfield Village tend to prefer weekend visits (57% to 72%). Only during the December season is there a 50-50 split between weekdays and weekends. Family groups dominate the psychographics, being 52% or greater.

THE SAMPLE

I observed and interviewed fourteen groups who visited the museum during the month of March, 1997. See Table 3 for a brief description of the groups. I selected each group included in this study on the basis of their attending behaviors. I interviewed these groups on two dates, March 1, and March 29, 1997, both Saturdays. I chose weekends in order to avoid conflicts with school trips. I visited the museum during days when school trips were being conducted and I noted that the entire atmosphere of the museum was radically changed by these large, noisy groups. There seemed to be an energy that made every visitor more intent on rushing through their visit and, therefore, much less likely to spend time looking at the locomotive and more prone to cut their conversations with me quite short. The noise level was also increased remarkably, making tape recording more problematic.

Group Number	Description	Number of People
1	Mechanical engineers from Italy. In town for the SAE (Society of Automotive Engineers) convention, which just concluded.	3
2	Older father and mother up from Toledo, OH. Visiting with adult son/daughter and daughter/son in-law.	4

3	Mechanical engineers from the U.S. Visiting as a follow-up to the SAE Convention.	3
4	Retired husband and wife. Here with family, but family was not with them during the interview.	2
5	Grandparents and adult granddaughter.	3
6	Grandparent with minor grandson	3
7	Family group. Husband, wife, minor son and daughter.	4
8	Older couple from Canada	2
9	Father and adult son. In museum with additional family.	2
10	Husband and wife.	2
11	Two brothers from Canada.	2
12	Two retired men.	2
13	Father with minor son and daughter.	3
14	Parents with adult son and daughter in-law.	4
Table 3 Groups Interviewed		39

I did not randomly select the sample, as noted in Chapter I, for three reasons. First, this study focused on attention, making any group paying attention a viable candidate for the sample. Second, I was not relying on statistical methods that demanded a random sample in order to yield valid results. Third, and last, this study is exploratory in nature, seeking to tease out the traits and attributes that are present in groups and individuals who are paying attention to the locomotive.

DATA COLLECTION AND PROCEDURES

I approached groups visiting locomotive #1601 who were exhibiting behaviors indicative of paying attention and requested permission to talk with them about their visit. I used an interview guide (Appendix B) to direct the conversation. I tape recorded the conversations and

then transcribed them immediately after the day was concluded. I also maintained field notes containing observations made while the groups were interacting with the locomotive prior to the interview and thoughts that occurred to me during the interview, recorded immediately after the interview.

I visited the museum on two occasions prior to beginning the actual data collection. I thoroughly inspected the exhibit on the first visit. I observed traffic patterns through the exhibit, selected a position where I could observe the attention indicating behaviors of visiting groups, and located possible points to intercept these groups to ask for and conduct an interview.

I used the second visit prior to actual data collection to pilot the preliminary interview guide (Appendix A). I interviewed two groups that exhibited attending-like behaviors. During these interviews I determined that the original interview questions were not adequate in the following ways: 1) The questions did not 'feel' right. That is, they seemed awkward; and the conversation didn't seem to flow well from question to question. 2) Some of the questions seemed to be more appropriate as follow-ups to other questions. 3) The guide itself was difficult to use. It was not easy to navigate visually during the interview. And the fact that it was longer than one page made things awkward when the time came to turn the page. 4) The actual act of turning pages seemed to send a message to the interviewees that the interview might take longer than they had originally thought, making them give more hurried answers for questions on the second page.

I dressed as a 1940s railroader during both the pilot and the actual data collection. My costume consisted of a dark blue work shirt with long sleeves, matching dark blue trousers, and work shoes. Dark blue and yellow were the C & O colors in the 1940s and the clothing was

chosen for that reason. Also, the "C & O for Progress" logo appeared above my left shirt pocket, as it does on the tender of the locomotive. My first name, "John," appeared above my right pocket and my museum business pass was placed below the C & O logo.

On both March 1 and 29 I observed the first group that arrived on the scene in the morning for attentional behaviors.[6] If they exhibited such behaviors, I intercepted them at the rear of the locomotive and asked them to consent to participate in an interview. When I concluded the interview, I recorded brief notes explaining the group's make-up and my impressions. I then looked for and observed the next group to begin their visit for attentional behaviors, asked them to consent, and repeated the sequence.

I informed each group of my identity and the purpose of the study. I asked about the presence of parents or guardians of minors and if tape recording for note-taking purposes was acceptable. I informed the participating visitors that they could refuse to answer any question or terminate the interview at any time; then I asked for their informed consent. See Appendix C for the Informed Consent procedure.

Fourteen out of the fifteen groups I approached consented to the interviews. The sole refusal was from a woman with five minor children. She indicated that she had just driven many hours to arrive here and wanted to see as much of the museum as possible.

At the conclusion of the interview I thanked the groups for their time and offered an informed consent letter. This letter is reproduced in Appendix D and contains a written version of the introduction plus a phone number at the University where they could make a contact, should they wish to do so. No one accepted a copy of the letter.

Also at the conclusion of the interview I offered a complimentary bookmark as a token of my thanks for their time. This bookmark was 5-1/2" x 2-3/4" and contained additional information about the #1601; it is reproduced in Appendix E. All participants accepted the bookmark. I also offered them a copy of the informed consent letter. No one accepted the letter.

DATA CODING AND ANALYSIS

Data for this study came from two sources: 1) Interviews conducted on the exhibit floor and 2) Field notes written immediately before and after each interview. I elected to use the QSR NUD*IST software to manage the data that was generated by the interviews and the notes. I decided that only a limited number of the many features included in the software were needed to efficiently manage the data from this study. I will describe here only the features used to analyze the data. If interested, the reader may consult the QSR web page for a description of NUD*IST's additional and advanced features[7].

QSR NUD*IST is a powerful qualitative analysis software program that places the power of the computer at the researcher's disposal to analyze the data generated from a qualitative study. Qualitative Solutions and Research in Melbourne, Australia developed the software to meet the unique needs of qualitative researchers in analyzing the type of data generated by their studies. The acronym NUD*IST stands for **Non-numerical, Unstructured Data, Indexing, Searching, and Theorizing**.

Qualitative data is by its nature non-numerical and largely unstructured. A major activity that qualitative researchers employ in data analysis is the process of coding. This was the major feature of the software that was used in the analysis of the data collected in this study. This coding involves looking for recurring patterns and naming these patterns. NUD*IST calls these

patterns *nodes*; and each node is assigned a name. NUD*IST permits the creation of nodes that are free of organization and are thus called *Free Nodes*. Nodes can also be linked hierarchically to form an index tree which is suitable for more complex projects. When linked, they are no longer free of organization, i.e., no longer free nodes. I did not use linking in this study due to the limited number of nodes generated and their relatively simple relationships; only used free nodes were used. Miles and Huberman (1994) suggest beginning with a provisional or "start list" of codes. In this research the start list came from the attention model. Additional codes emerged from the data and were assigned node names as they were encountered. A listing of the free node names used can be found in Appendix F.

Before nodes can be assigned, however, the original word processing text must be prepared for importation into NUD*IST. The text must be in an appropriate format in order to be useable for coding. To do this the researcher must first decide what the *text unit* should be. The text unit is the smallest part of the document that can be coded and retrieved once it has been imported into NUD*IST. For this project the paragraph was chosen as the text unit. The response of each group member to the researcher's questions became the paragraph. In order to format these responses as the text units, they must be typed into the word processor without the use of hard returns, i.e., the text must be allowed to word-wrap. The appearance of hard returns is interpreted by the NUD*IST software as a demarcation between text units. The final step taken while still working in the word processor is to save the text in the ASCII or DOS text format. The text for this study was saved in fourteen documents, one for each group interviewed.

In order to facilitate additional coding and searching capabilities, NUD*IST allows the entry of inserted text units after the primary text is imported into NUD*IST. Inserted text units

allow the researcher to make interpretative comments while analyzing the data and to place the inserted text next to the document text to which the comments pertain. These inserted text units can later be coded and searched in the same way as the document text itself.

I generated two kinds of reports from the NUD*IST software after coding and adding inserted text units . The first was a transcript in text unit format which includes the document text, the inserted text units, and the associated text unit numbers that are generated by NUD*IST. The second was a listing of text units coded according to each of the fifteen free nodes listed in Appendix F. The former provided a sense of context within the overall interview while the latter provided the specific evidence necessary to validate the use of the nodes themselves.

The NUD*IST software helped me access both the data and the indexing associated with that data. This access was my goal. I saved a great deal of time by having random access to the data and index categories and by avoiding the awkward data manipulation that is inherent in non-electronic data management techniques. This flexible access also carried over to the writing of this report by allowing me easy access to any of the data or indexing as needed and allowing simple copying and pasting of selected data.

SUMMARY

In this chapter I presented the research design and methodology used in this study. I included the setting of the research in the context of the museum, the transportation gallery, the locomotive itself, and the visitors who came to Henry Ford Museum. I described the procedures used in conducting the interviews as well as the concurrent and subsequent data analysis.

CHAPTER IV

RESEARCH FINDINGS

INTRODUCTION

This study was undertaken in order to describe the factors influencing a visitor to pay attention to a museum exhibit. I interviewed fourteen groups visiting the Chesapeake and Ohio steam locomotive #1601, the Allegheny, at Henry Ford Museum to learn what influenced their attention to the exhibit. The study findings I will present are patterns that emerged from the data, along with a mapping of each group's path through the Attention Model.

GROUP PATTERNS (Stories)

The fourteen groups who visited the C&O #1601 each experienced something different; their varied backgrounds and their family/social group interactions uniquely affected their experience with the exhibit. I observed each group as they came into the exhibit area and moved along the locomotive, looking for overt evidence of attention. Although each interaction was unique, four typical 'stories' seemed to emerge from the observations of these groups.

Each group entered the exhibit area from the front of the locomotive (see Figure 4). As they entered I began to observe their behavior from my vantage point near the small locomotive that Henry Ford named "The President" for the ceremonial opening of the village/museum complex (see Figure 4). Groups exhibiting behaviors indicating that they were paying attention to the exhibit became candidates for an interview. However, I did not consider interviewing any groups that just casually strolled through the exhibit area, only giving the exhibit a glance or two.

I considered behaviors as indicative of attention when the group was interacting with the locomotive and others in the group. Attention behaviors included stopping to read the label, stopping to look at different areas of the locomotive, discussing something with other group members in a manner that would lead an observer to conclude that the locomotive was the subject of the discussion, gesturing toward the locomotive, going back to take a second look at something, and similar behaviors. Granted, they could be talking about lunch while pausing, but behavior was being exhibited that would lead most observers to conclude that the locomotive was the subject of their attention.

My notes indicate similar patterns of interaction for several of the groups, i.e., groups tend to cluster around common 'stories' that describe their visit. Each group within each 'category'--story-- exhibited slight variations, of course, but the commonalities outweighed the differences. Here are the stories of their visits:

Story #1 - An Engineering Visit

> Both groups of mechanical engineers who were a part of this study were in town for the Society of Automotive Engineers convention that had just concluded the day before their visit. Each of these groups consisted of three unrelated male colleagues who chose to come to the museum in order to achieve social goals and to look at mechanical engineering technology from the past. The large locomotive acted as a magnet for these engineers who saw it as they entered the museum. They immediately became engaged in conversations about the locomotive, the engineering that went into it, and the logistics of its construction. They were drawn primarily due to their interest in mechanism and mechanical transportation.
>
> They were observed congregating in front of one of the locomotive's components to discuss functions; frequently pointing to various components and tracing pipes from point-to-point. Next, one of the group members would walk a short distance from the group to scrutinize another component, call the group over, and the process would begin anew. Frequently, they would retrace their steps to revisit an area where they had already been. They discussed the engineering, functionality of components, and expressed amazement that such a machine could be designed, laid-out, and built without the use of computers. [Groups 1 & 3]

Story #2 - A Tale of Two Brothers

The Henry Ford Museum does not have a Great Lakes freighter on display. If there was a lake boat, then the Allegheny would have been a second choice for two brothers who came over from Canada for the day. As it was, however, the #1601 was the closest thing to their own particular interests in steam powered transportation; it consumed their interest, just as a great lakes freighter might have done.

These men were observed circling the locomotive again and again, occupied in a discussion of the function of each of its components. At first, their behavior would lead an observer to think of them as devoted steam locomotive aficionados. But when they revealed their interest in lake boats during the interview their behavior regarding the locomotive became clear; they made many comparisons to the boilers and steam engines aboard boats. Their passionate interest interfered with their ability to concentrate on my questions. They constantly asked questions about the locomotive. In fact, it became obvious that it would not be possible to have our conversation around the interview questions first and return to their questions at the end of the interviews. Therefore, we mingled questions relating to the research with their questions about the locomotive as our conversation proceeded. [Group 11]

Story #3 - A Docent in the Group

Two of the family groups that were a part of this study had one member, a male in both cases, who had worked as a locomotive engineer. One gentleman was currently employed by Conrail and another had operated a locomotive in an industrial setting, but now retired. In both of these groups this knowledgeable group member pointed and explained, assuming the role of a 'docent.' This docent member was clearly leading the group during their visit to the locomotive exhibit. The remaining group member, wives in both cases, was either relatively passive or a bit more engaged, asking questions and also interacting. These groups spent close to ten minutes of their visiting time with the locomotive, which was almost double the average time for most of the other groups. [Groups 8 & 10]

Story #4 - A Social Visit

Most of the groups observed attending to the locomotive were in the museum for a family or social outing. These groups made a decision to visit the locomotive once inside the museum and, upon arriving at the exhibit, spent time looking at the locomotive, engaged in conversation amongst themselves, and seemed to be in no particular hurry to leave the exhibit. The locomotive is one hundred twenty-five feet from coupler to coupler and these groups leisurely made their way along its length, engaged with the exhibit.

There was some variability in the group dynamics from group to group but each group was similar enough to consider their visit to be a social outing. Only one of the

groups was not composed of related family members, this singular group was comprised of two retired gentlemen, possibly long time friends. All of the groups in this category interacted with the locomotive in a very natural way, integrating it into their social group and conversing very naturally amongst themselves and talking about it and the place that trains held in their shared histories. [Groups 2, 4, 5, 6, 7, 9, 12, 13, & 14]

Two groups of mechanical engineers conducted their visit according to the first story. One group's visit is represented by the second story, and two groups by the third story. Of the fourteen groups studied, therefore, only five were specialized enough to require a relatively unique story to describe their behaviors prior to the interview. Nine of the groups behaved according to the scenario depicted in story number four.

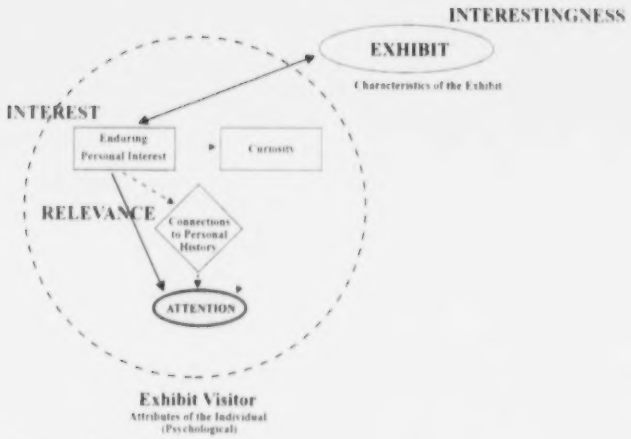
Each group, regardless of story, took their own path through the attention model (see Figure 3). The following descriptions present a group-by-group mapping of the path(s) that each took through the model:

Groups Included in Story #1

Group 1

This group of three European mechanical engineers was drawn by an intersection of their own **Enduring Personal Interest** in mechanism ["Since we are engineers, we are interested in mechanism."] and the Interestingness of the exhibit with regard to mechanism, a **Connection to Personal History** also came into play when one considers their experiences in European museums ["Like this kind of locomotive very much from museums in Europe."]. Their **Curiosity** seems to have become peaked after they arrived as they posed all of the mechanical engineering related questions about its construction and function ["How it works."].

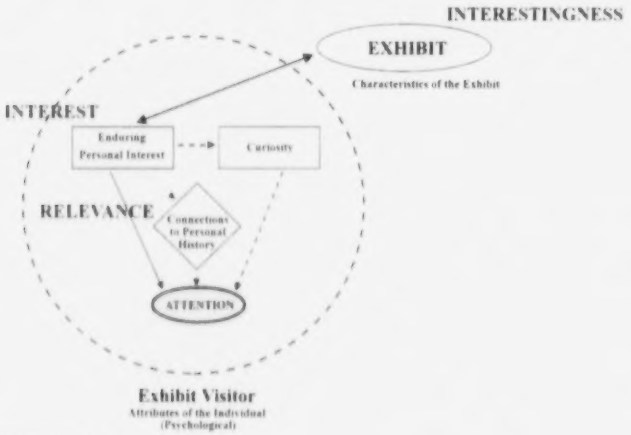
(NOTE: In the diagrams accompanying each group the primary path is shown by the solid lines, the secondary path by the dashed lines, and the tertiary path by the dotted lines. The paths were so designated on the basis of the emphasis given by the groups during the interview. I asked NUD*IST for a report on each node and looked both at the number of statements made by the group or inserted by me and the quality of the responses. Seven of the groups also contain notations on the Group Influence element, clarifying how it operated for that group.)



Group 1

Group 3

These three American mechanical engineers were working their way around the outside of the museum when they encountered the locomotive. In many respects they were similar to Group 1 in that their **Enduring Personal Interest** in mechanism and mechanical transportation ["Mechanical transportation in general."], together with the size of the locomotive, attracted them **(Curiosity)** ["What's the steam pressure?""How much steam are we talking about, this seems an outrageously big size!"]. Members of the group had a **Connection to Personal History** in having ridden some of the historic steam railroads in Colorado ["Ridden some of the historic ones they run out in Colorado."].



Group 3

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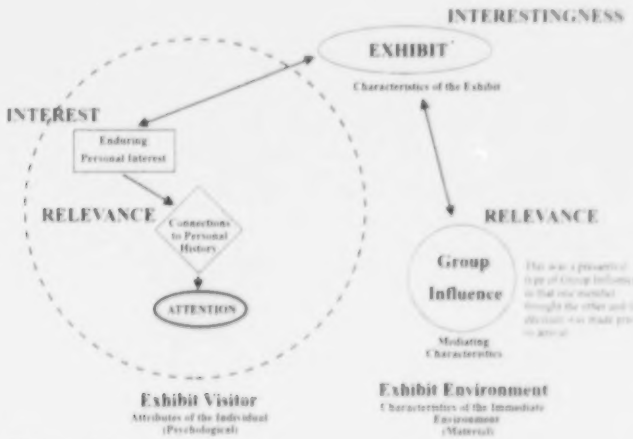
Group Included in Story #2

Group 11

For these two brothers **Group Influence** played a small role in that one brother brought the other ["I knew it was here, he's never been here before."]. But in terms of their knowledge of and interest in Great Lakes boats, it was a strong combination of **Enduring Personal Interest** in steam transportation ["If you go way back, this country...everything was done since 1830."], **Connections to Personal History** ["My young lad works for the Hanjin steamship lines."], mechanism, and efficiency ["It's a fairly inefficient system of using the steam. The freighters use the steam up to three times."].



Group 11

Groups Included in Story #3

Group 8

This older couple from Canada was primarily influenced by **Connections to Personal History** ["I used to be an engineer in a steel mill in Hamilton, Ontario."]. The **Interestingness** played a role when the group came in the door and saw the locomotive ["I came in the front door and saw this."]. **Curiosity** is less a factor with this group ["What speed would they be traveling?].

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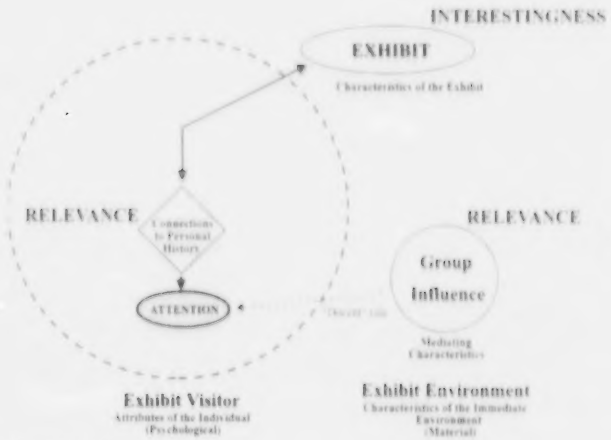
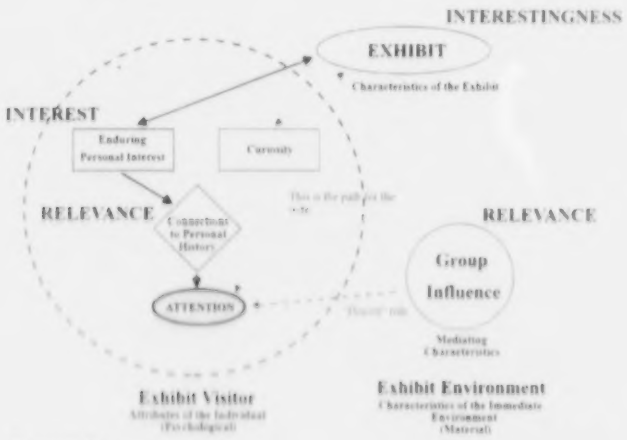


Group 8

Group 10

Connections to Personal History provides the entre for this husband and wife in that the gentleman is a Conrail locomotive engineer ["My dad worked for the old Nickel Plate. My grandfather worked before him, and he had two uncles who worked on the Illinois Central, down South. My brother for the NS [Norfolk Southern]."]. I suspect some interplay with **Enduring Personal Interest** as he works for the railroad ["I work for Conrail."]. **Group Influence** of a specialized kind occurred here in that his experience allowed the gentleman to play 'Docent', explaining some of the locomotive's features to his wife. There was some level of **Curiosity** with regards to the features not understood ["How did they get it in here?"].



Group 10

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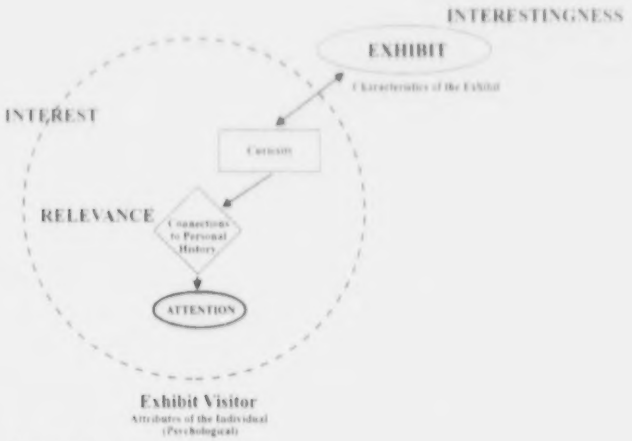
Groups Included in Story #4

Group 2

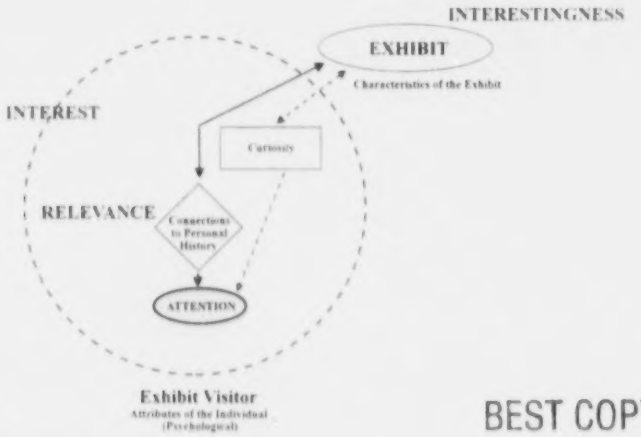
Curiosity was probably the biggest draw for this older couple ["How much does it weigh?""How does the track support it?"]. They were primarily interested in the size of the locomotive but had a geographical connection in that it was built in Lima, Ohio, not too far from where they lived (**Connection to Personal History**). The locomotive caught their eye as they browsed the museum.



Group 2

Group 4

This retired husband and wife clearly entered into the model through **Connections to Personal History** ["My dad worked on the railroad when I was young."] and **Curiosity** ["Is it run by coal?""How fast do these trains go?"].



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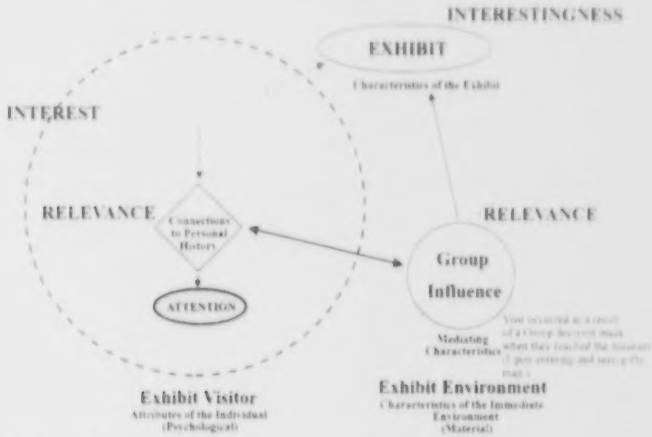
Group 4

Group 5

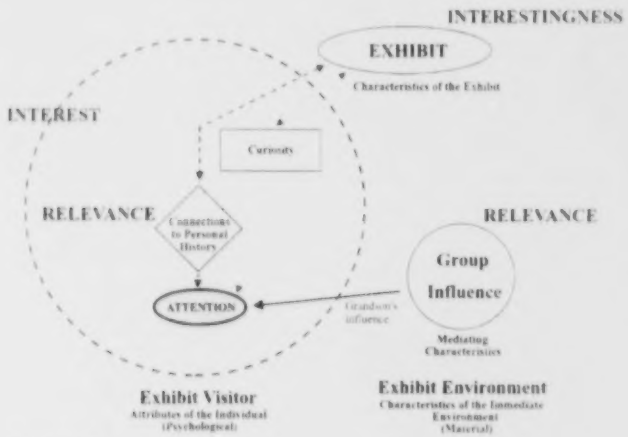
Connections to Personal History was a factor for these grandparents and adult granddaughter ["Grew up around trains."] as well as their **Group Influence** decision to look at trains as a part of their visit ["Looked at the brochure and thought we'd take a look at trains."].



Group 5

Group 6

This extended family group (grandparents and grandson) also came to the exhibit based on **Connections to Personal History** ["It's built in Lima [Ohio] which is just north of where we live."] and **Curiosity** ["Just the engineering. The plumbing. How they run what pipe to go to where."] but the stimulus was the grandson's **Group Influence** effect ["The grandson brought us over here."].



Group 6

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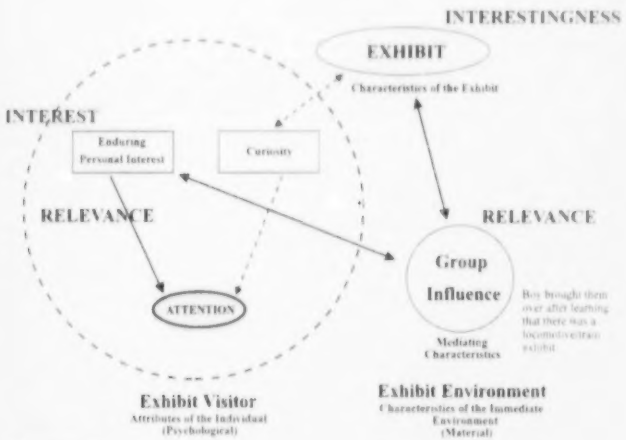
Group 7

Here is another example of **Group Influence** (husband and wife, minor son and daughter) in that the boy brought them over to the exhibit. There also appeared to be a component of **Enduring Personal Interest** in trains ["Being a locomotive. Being a train."] and a healthy level of **Curiosity** ["How much water it used. How the water got into the steam engine."].



Group 7

Group 9

This father and adult son seemed least affected by elements of the Attention Model. They were just browsing and came across the locomotive. It appears that **Curiosity** may be the only element in operation here ["Fuel consumption. How fast it would go. Where it's been. Things like that."].

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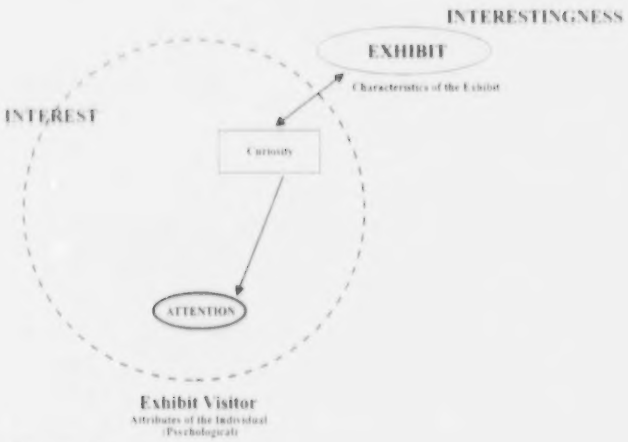
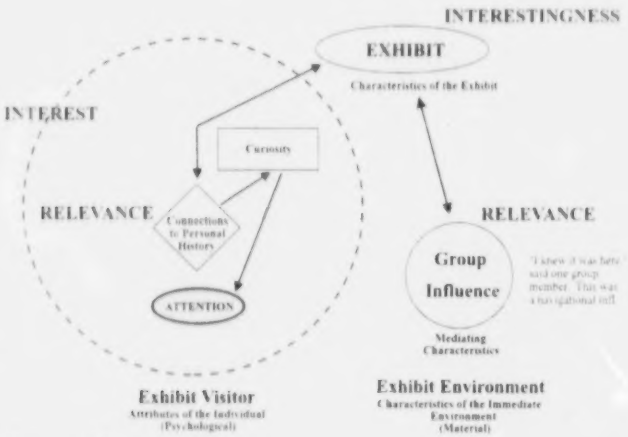


Group 9

Group 12

Group Influence ["I knew it was here. He's from out of town. I knew this was here and I wanted to see it again."] and **Connections to Personal History** ["The train whistles [from the tape] took me back to the days when I was growing up. I grew up alongside the railroad."] were probably the most influential factors for these two retired men. These gentlemen had many memories of growing up around trains and the 'good old days' in general. The other major factor was **Curiosity** ["How long did it take them to build just this one engine?"].



Group 12

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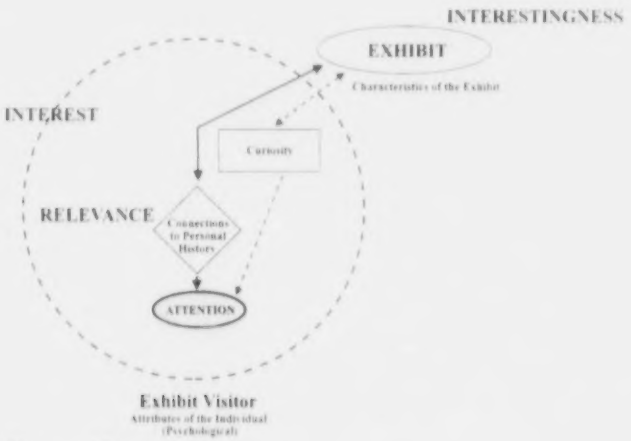
Group 13

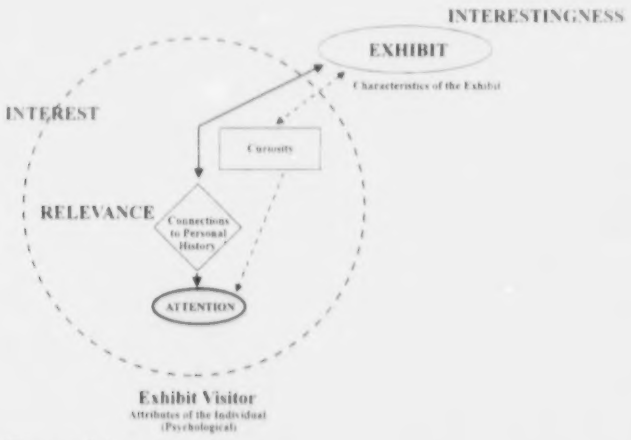
The largest influence for this father, minor son, and minor daughter was **Connections to Personal History**["My grandfather worked for the Grand Trunk, he was a fireman."]. **Curiosity** was the next most influential ["I was curious how they thought of all this stuff for it."].



Group 13

Group 14

This was a railroad family (parents, adult son, and daughter in-law) so **Connections to Personal History** ran high as the factors that motivated their attention ["I used to work for the Illinois Central."]. There was also a large contribution from the **Curiosity** element ["I had two uncles who was engineers. I'm sure they're just about as inquisitive about it as I am."].



Group 14

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Summary of Paths Taken Through the Model

There was evidence to show that seven of the fourteen groups spent time attending to the locomotive seemingly because of connections to personal history. Three of the fourteen groups may have attended to the exhibit due to group influence. Two groups seem to have been influenced by enduring personal interest and the final two may have been primarily influenced by curiosity. Therefore, the attention of ten of the groups was probably influenced by relevance factors and four by interest factors.

REVIEW OF THE ATTENTION MODEL

The Attention Model for Museum Exhibits was shown in Figure 3, but is reproduced here as Figure 5, for convenience. From the review of the literature in Chapter II I found inconsistencies in the use of some of the elements in the model: Interest, Curiosity, Attention. I gained insight from the literature in the work of Hidi and her associates that held the potential to add some clarity to this situation.

The model in Figure 5 posits that the categories of *interest* and *relevance* hold the power to provide a plausible prediction of attention. Interest is divided into *enduring personal interest* and *curiosity* to represent both idiosyncratic and more general-properties of the exhibit visitor. Relevance is divided between *connections to personal history* and *group influence* to represent both internal and external motivation to attend. As can be seen from the model, I anticipated that there will be many paths through the model as these various elements interact. This was, in fact, one of the reasons that I chose a qualitative method, to allow the visitors freely describe their experience and allow the analysis to reveal any complex patterns.

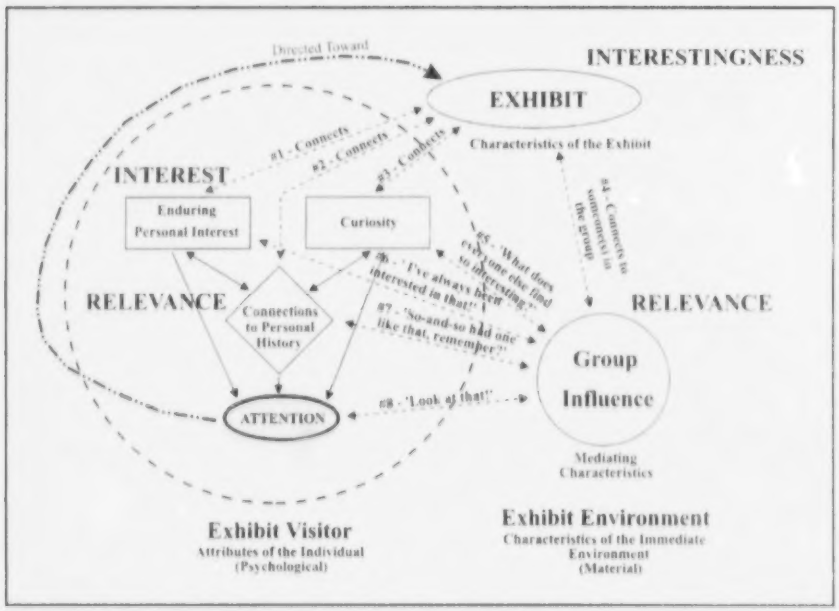

Figure 5 Attention Model for Museum Exhibits

EVIDENCE RELATING TO THE ATTENTION MODEL

I have just described the typical visits for the fourteen groups involved in this study. Following that, I mapped their path through the Attention Model. In this section I will first move through the Attention Model's components, drawing excerpts from the data that lend support the presence of that element. Then, I will provide a brief summation of the findings.

The Model's Components

Enduring Personal Interest

Enduring personal interest refers to a relatively stable propensity of an individual to be motivated by a particular class of objects. In this case, I assumed that individuals would be motivated by locomotives, trains, transportation, or some other aspect embedded in the #1601.

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Some of the visitors demonstrated that they may have paid attention because of the mechanical engineering inherent in the locomotive. Two of the groups were mechanical engineers who were in town for the Society of Automotive Engineers (SAE) convention that had just ended prior to the first day of interviews. These engineers were interested in the design, mechanism, and building of the locomotive. A group of three engineers from Italy said, "We come from Europe. We are engineers, and we have never saw something big like that." A group of three engineers from the U.S. were interested in "mechanical transportation in general." Both groups expressed interest in design and were amazed to think of designing and building a locomotive like the #1601 without the aid of computers.

Most visitors, however, had long term interests that were not driven by their profession. One visitor had seen the locomotive before and developed an interest in it and brought a friend to see it as well, "He's from out of town. I knew it was here and I wanted to see it again." Another visitor expressed a similar interest in the #1601 and said, "Actually I've been here before and I knew it was here. Wanted to see it again."

Thus, we can clearly see evidence that enduring personal interest motivated by either professional interests or from non-professional interests may be related to attention.

Curiosity

Curiosity is a prevalent propensity within the human species to direct interest to objects that are strange, exotic, or hold a prominent place in our history. Many people showed that their attention may have been affected by the sublime characteristics of the locomotive. Comments that were expressed by every group and, sometimes, repeatedly by the same group included, "Very big." "Huge." "I've never seen anything quite that big." "The size of it." "It's HUGE!!!"

"Awesome." This emotion was perhaps best described by a boy about eight years old who said, "It could kill me!"

One of the hallmarks of the sublime is the difficulty in describing it. David Nye (1994) says, ". . . like every sublime object, this [referring to the Golden Gate Bridge] magnificent piece of civil engineering cannot be comprehended through words and images alone. When visited, it outstrips expectations" (p. xi). Visitors to the #1601 were hard pressed to describe the locomotive. They said, "Beyond description, see it!" "Go and see it." "Encourage everyone in general to come and see it. It's amazing." "Tell them if they really want to see a HUGE one, to come and take a look."

Man's ability to conquer time and distance by harnessing raw power is another aspect of the sublime. Visitors alluded to this scale of technological accomplishment by saying, "It's such a big engine. I mean, I know there's a lot of power in them by the size of the boiler and stuff like that." "I mean, you can see, I mean look at the enormity of all the things on the outside." "I thought how huge it was--massive. And how complicated it must have been back at that time to design and build something like that. I've been around, but this thing's huge!"

Visitors responded to my queries about the questions they might ask an expert and what they were thinking about by expressing a more general curiosity about how it was built, how it worked, and how something that big stayed on the tracks. One group wondered, "How much does it weigh? How does the track support it? Where was it made at?" A husband and wife queried, "Is it run by coal? How fast do these trains go? Did they have very many accidents with these big trains like this? Did they have very many mechanical problems? How did they turn

them around? What did they call that thing that turned them around? Did they have someone who put the coal in? How did they get the coal in? Did it have the caboose on the end?"

The American mechanical engineers wondered about its "Complexity and how they were able to fit everything in there without laying it out on a computer ahead of time." The Italian mechanical engineers were concerned about, "Time to market--idea to finish." While one of the non-engineering groups was interested in "How they made it? How they drilled the holes? Did they do it all by hand or did they have big machines? What kind of crane they used to put all that stuff up on top of it?"

A father and son engaged in the following exchange: Son: "Why did they make it just, all, like black?" Father: "It's like the Ford Model Ts. It was available in your choice of colors, as long as it was black." The son then asked, "Who designed it?"

The fourteen visiting groups who participated in this study exhibited a high level of curiosity, as evidenced from the foregoing comments. The responses of eleven of the fourteen groups displayed a level of curiosity that indicated that it was this factor that engaged their attention.

Connections to Personal History

There was evidence that connections to personal history was operating and may have influenced attention. Connections to personal history ranged from a connection to visitor's professional lives (mechanical and locomotive engineers) to the personal connections of those who's lives were touched in some way by railroads. For example, a man from Hamilton, Ontario, Canada said, "I came in the front door and saw this. As soon as I saw it, it caught my eye. I can remember sitting up in there and pulling the levers, like I say this size down here

[pointing to one of the smaller locomotives nearby that was closer in size to the locomotives he ran]." While a retired woman said, "Reminds me, when we lived in Ohio, every morning we would hear the whistle from the train and I always thought, 'I would like to ride a train like that someday.'"

Some connections are not so positive. Two brothers from Ontario, Canada, recalled, "Oh, him and I were hit by a train in 1949. Up in northern Canada." A woman from Toledo, Ohio, said, "My mom got a cinder in her eye from a steam engine." Other connections are through the family, such as the grandfather who commented that he used to work for the Illinois Central Railroad, his grandfather retired from railroad service, and two of his uncles were railroad engineers. Or the connection might be geographical, "It's built in Lima which is just north of where we live."

A sub-category that emerges under connections to personal history is *nostalgia*. For example, trains and Christmas have traditionally gone together. One woman reminisced, "We used to have a little train under our Christmas tree. Do you [directed to her husband] remember when we were kids, everyone had a little train running under the Christmas tree? Trains were the thing then." One man simply said, "I liked to look at them as a kid." Two retired men who were visiting noted, "And of course as a kid I rode trains a lot. Nostalgia. It was good times."

The evidence is strong to support the presence of connections to personal history and that subsequent attention was initiated by these connections. Whether the connections be professional, personal, or just a rush of nostalgia, people expressed strong ties between the locomotive and their own lives.

Exhibit

An exhibit may be attractive because of its interestingness and uniqueness. There is evidence that visitors noticed the exhibit's unique characteristics. Or, as one visitor commented, "It's probably one of the most unique things they happen to have here. Not many places have a complete engine." Another visitor commented, "It's one of the main attractions here."

Thus, people may be drawn to the locomotive due to its power to attract. To say, however, that the locomotive has this power is to walk a fine line for, like curiosity, there has to be some strong propensity within the population that is drawn to the exhibit's characteristics of interestingness and uniqueness. The exhibit must resonate with the visitors' humanness and cultural perspective.

Group Influence

Group influence is subordinate to relevance. That is, if the exhibit is relevant to someone within the group, it has potential to be relevant to everyone within that group. One of the more powerful ways that group influence may operate is when one group member assumes a leadership role during a portion of the museum visit because of their personal expertise.

There was evidence that leaders influenced the attention of others in the group. For example, some visitors assumed the role of a docent. One such visitor said, "Some of the running gear on it--I was pointing out to her the sand pipes on there, the reverse gear, and the brake rigging on the engine." Others, such as the brothers from Canada, shifted that role from one group member to the other as their expertise permitted.

Another powerful group influence was the role of leading the group to the exhibit in the first place. One group looked at the "Finding Your Way" brochure and commented, "We

decided to start on the end. Looked at the brochure and thought we'd take a look at trains." Sometimes, the leader was a single member of the group. In one case, a minor, "The grandson brought us over here."

Thus the relevance for one member of the group often results in a new relevance for other group members and thereby affects their attention. Whether it be a joint decision concerning which exhibits to visit or the urging of one member, it appears that group influence may be an influential element of the model.

Emerging Themes Related to the Attention Model

Two elements that may influence attention emerged from the research; that of *new interest* and *imaginings*. A new interest involves a visitor who came to the exhibit with one interest, the one that motivated the attention, and left with another. Imaginings is a construct derived by Raphling and Serrell (1993) as a component of affective learning. It involves the visitor stepping outside their own experience, trying to imagine what daily life was like when the artifact was in regular service.

A representative example of how new interest operated in a visit involves the mechanical engineers. At the start of the visit they were motivated by their interest in the mechanisms in general. Before they were through with their visit, however, they had a new interest in locomotives. Or as one of them said, "We are hooked." Another visitor who came because the locomotive was a steam locomotive (i.e., his interest was in steam), found much in which to invest his attention. He said, "I'll think more about this even tonight." Each of the above examples represents a focus on a new interest; these individuals will probably seek out locomotives in other places they visit.

How wonderful to find that visitors were projecting themselves into the roles of people in the 1940s! Imagining what life was like when the locomotive was in daily use demonstrates a higher level of cognitive involvement on the part of some group members as a result of their attention. I believe that imaginings would be best characterized as an affective response to the exhibit. Within the affective domain taxonomy this would be at the "Willingness to Respond" level. "This is not so much a response to outside prompting as it is a voluntary response from choice" (Krathwohl, Bloom, & Masia, 1963, p. 125). This activity is voluntary.

Several visitors were engaging in this voluntary thinking. One visitor was "Trying to imagine the number of people it took to go down into the mines and things to do the coal to make one of those things run. And the number of lives that were lost in those coal mines." One woman wanted to know "Where they went to school to learn how to run it?," implying a train of thought about the apparent complexity of the machine and how people learned to interface with it. Others imagined how difficult the work was: "The poor guys that built it [and] those poor guys who had to feed that sucker going down the road."

Emerging Themes Related to the Exhibit

Three elements that describe visitors' expectations for the exhibit also emerged from the data. Visitors wanted *additional interpretation*, *museum experience*, and were concerned about *personal limitations*.

Those wanting additional interpretation mentioned such items as, "Tour." "A walkway [higher than this one] to get a better view. Closer to the most important parts to help the people understand[s]." "Maybe, being able to see it from a different angle, a different perspective." "How they made it. How they drilled the holes, how they did this or that." "Show a diagram of how it

was put together, where it was put together, and the various stages of assembly." "Use TVS to show the start-up of the train; show how that works. We're all TV oriented now. I would suggest they have some sort of video made up to show its points." But the most common comment of all was, "I'd like to get up inside that engine!"

Museum experience is a broad enough category to include that latter statement--getting inside the cab--but also includes visitors' desires to have other experiences as well. For example, "Would have liked to see it coming down the track when it was around. Would have liked to see the engineer." "Some cutaways of the steam mechanism, the boiler, and the pistons. More technical details."

Lastly, the personal limitations of the visitors came into play. These tended to center around sight and sound. In response to the tape running at the front of the locomotive [which was quite loud but could benefit by some equalization], "Turn up the volume." And in terms of sight, "The placards--bigger! If you noticed us with bifocals..."

SUMMARY

This chapter summarized the findings relating to the elements of the Attention Model and the exhibit itself. The model looks like a plausible[9] description of motivational processes within the categories of interest and relevance that did, in fact, lead to attention in a museum exhibit for the fourteen groups interviewed.

The following items highlight the findings of this study:

- ✔ The fourteen groups included in this study had one of four different kinds of visits, called 'stories.'

- ✔ The first three stories represent more specialized visits: engineers, steam aficionados, locomotive engineers.
- ✔ The fourth story represents the more typical family/social visitor.
- ✔ There were variations in paths through the attention model even within stories.
- ✔ The major categories within the attention model--interest and relevance--were plausible predictors of attention.
- ✔ The elements within these categories--enduring personal interest, curiosity, connections to personal history, and group influence--were powerful enough to describe the attention of the fourteen groups included in this study.
- ✔ The exhibit held a power to attract that could be described by Hidi's term *interestingness*.
- ✔ Group influence also functioned in ways not anticipated.
- ✔ Two elements emerged from the study: *new interest* and *imaginings*.
- ✔ Visitor's expectations from the museum/exhibit were *additional interpretation*, *museum experience*, and concern about *personal limitations*.

CHAPTER V

CONCLUSIONS AND DISCUSSION

INTRODUCTION

The purpose of this study was to verify **Which factors in the exhibit environment or within the visitor result in attention being expended on a museum exhibit?** Five research questions emerged from the literature about how enduring personal interest, curiosity, connections to personal history, group influence, and/or interestingness played a role in motivating attention to a locomotive in a railroad exhibit:

1. What role does the **Enduring Personal Interest** of the visitor play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?
2. What role does the visitor's **Curiosity** play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?
3. What role does the visitor's **Connections to Personal History** play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?
4. What role does **Group Influence** play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?
5. What role does the **Interestingness** of the exhibit play in eliciting attention to a locomotive in a railroad exhibit embedded in the transportation section of a museum of technology?

Motivational elements fell into two broad categories, interest and relevance. Using the literature, an attention model for museum exhibits was constructed for use in this study. The previous chapter presented the findings of this study to illustrate the plausibility of the interest and relevance constructs as being prerequisites for attention. This chapter will summarize the

role of the Attention Model, provide suggestions for the museum from their visitors, and suggest the direction of future research in this area.

CONCLUSIONS

The findings provide some evidence to forward the hypothesis that the attention model for museum exhibits is a plausible explanation about how visitors pay attention in a museum. The findings lend support to forward the hypothesis that interest and relevance are motivators for attention. Further, the findings show that it is reasonable to hypothesize that subordinate elements of enduring personal interest, curiosity, connections to personal history, group influence, and the interestingness of the exhibit influence attention.

This model may replace the "Hook" in Csikszentmihalyi's and Hermanson's original diagram (see Figure 1). If the attention shown in the Attention Model is to lead to Csikszentmihalyi's Flow,[10] then Opportunities for Involvement, Conditions for Flow, and Growth of Complexity in Consciousness will follow. Csikszentmihalyi and Hermanson (1995) feel that the visitor must advance to the flow stage if learning is to occur. I believe, however, that we need to have a better understanding of the "hook" if we are to fully understand how people learn in informal environments. Our investigations in this area of museum attention and learning must start at the beginning, with the 'hook.'

A visitor's attention might not be engaged long enough or in a manner that would lead them to Csikszentmihalyi's flow experience (See Figure 1, levels B, C & D). Paying attention at a more superficial level may, however, still be beneficial to the visitor. Given adequate information, a visitor's attention might lead to learning in either the cognitive or affective

domains, and that might be enough to expect. Additional museum resources could add a psychomotor dimension to the exhibit experience and a high enough level of cognitive, affective, and/or psychomotor activity could result in either flow or, for visitors who had not previously encountered locomotives, what Csikszentmihalyi (1978, 1985) calls *emergent motivation*.

CONCLUSIONS FROM THE STORIES AND PATHS THROUGH THE MODEL

Four stories emerged from this study that describe how clusters of groups experienced the exhibit. That is, for the fourteen groups in this study four stories describe the range of visit experiences. If more groups were included many of them would likely fall into one of these stories but additional stories might also emerge if these additional groups had experiences that were significantly different. I am confident, however, that the attention model has the power to accommodate these new stories.

The two groups of engineers clustered in story #1 are remarkably similar. Their primary path through the attention model was interest in the mechanical characteristics of the exhibit. The difference between them was that their secondary and tertiary paths were just the opposite of each other. For the first group, connections to personal history were mediated by their enduring personal interest in the mechanical aspects of the exhibit. For the second, curiosity was peaked after their attention was directed toward the exhibit based on their enduring personal interest in the mechanics of the exhibit. Clearly even for these groups of visitors with relatively homogeneous professional backgrounds the paths taken through the model varied according to personal idiosyncracies.

Only one group is represented by story #3. These two brothers were such unique visitors that none of the other thirteen groups were even remotely similar. For these gentlemen the route through the attention model was clearly enduring personal interest in steam connected to their own personal history with steam powered Great Lakes boats and sons working on those boats. This group is an outlier to the extent that no other group expressed such intense interest in the exhibit. Such intensity is not the level that I would expect of the average family or social visitor to the locomotive exhibit. It does, however, lend credibility to the model in that the model has the power to unpack the attention-producing prerequisites even for a group as unique as this one.

The two groups in story #3 both enjoyed the presence of a member with railroad experience. In the first group the husband used to run an industrial plant locomotive that moved railroad cars around on the sidings within the plant complex. He is now retired and that experience represents a part of his working life at the steel mill. As such, the path through the model was a connection to personal history. He expressed no enduring personal interest whatsoever. In the second group, however, the husband is a current employee of Conrail, the Federally subsidized freight railroad here in the U.S. In this case it was an enduring personal interest in railroads that provided the primary contact with the exhibit that then fed into connections to personal history. I pause to wonder if people working for railroads are more prone to be imbued with a sense of their history and their place in the transportation system than would someone who's job is limited to shunting cars around an industrial complex. I am sure that many railroad workers view their job as nothing more than just a job, but many others tend to recognize something more subtle in railroad work.

The similarity of the groups is not limited to the job role, however, but is manifested in the role that both men assumed within the context of the visit, that of "docent." Each took the opportunity to draw upon their job related expertise to teach the other group member something about the locomotive. In both cases the other group member was a spouse. I would like to think that the wives had the same opportunity to become docents within other exhibits in the museum where their expertise was salient.

Two-thirds of the groups within this study had a visit experience that is described by story #4. These family/social groups not only represent the more typical group visit within this study but also represent the type of visitor that I expected when I chose Henry Ford Museum as the research site. The Hood (1991) study bears this out in that 58% of the winter visitors in that study were family groups. Indeed it was this more general group that I wanted to encounter in order to test the attention model. It is for this reason that I consider story #4 to be the most important story in this study. The attention model for museum exhibits must apply to the average family/social group if it is to have application beyond the #1601 exhibit at the Henry Ford Museum. I believe that story #4 represents the largest number of museum visitors to any but the most specialized museums and that the model's ability to describe the attentional prerequisites for these family/social groups is evidence of its value to museum educators and researchers.

The paths taken by the nine groups in story #4 through the attention model were definitely skewed toward the right side of the model. The primary entrées were curiosity and connections to personal history. Curiosity was the most prevalent element, occurring in all but one group. Connections to personal history was a factor in all but two of the groups within this story.

People visiting the #1601 didn't all attend in the same way. This is evidenced by the variety of paths taken through the model. But the categories of interest and relevance did play their roles in the attention paid the exhibit by the fourteen groups included in this study. Not all groups were drawn to pay attention by both interest and relevance factors. Three groups were drawn by either interest or relevance, while the other six groups were drawn by elements of both. The power of the attention model is, therefore, in its ability to describe the motivational processes leading to attention experienced in a variety of ways by groups with a multitude of backgrounds.

HYPOTHESES ABOUT THE VARIED PATHS

The attention model for museum exhibits posits two major constructs as motivators for attention: interest and relevance. Within the model are eight paths that lead from the exhibit and the visiting group to the elements within the visitor. The following 10 hypotheses set forth my interpretation of the data from this study in a form that can become the basis for future research or discussion.

For each hypothesis I draw a conclusion, unpack the meaning for the museum, offer an example of how the museum might apply my suggestions, and offer suggestions for future research. The reader should refer to Figure 6. The hypothesis numbers are attached to the relevant connection and are italicized and underlined. Following each hypothesis I discuss some of the findings related to group influence and how it acted in ways that went beyond my initial conceptualization. I also discuss Group #9. This group had only a single path through the attention model. Both of these discussions--Group Influence and Group #9--are framed in the

same way as the hypotheses, with conclusions, meaning of the museum, example application, and suggestions for research.

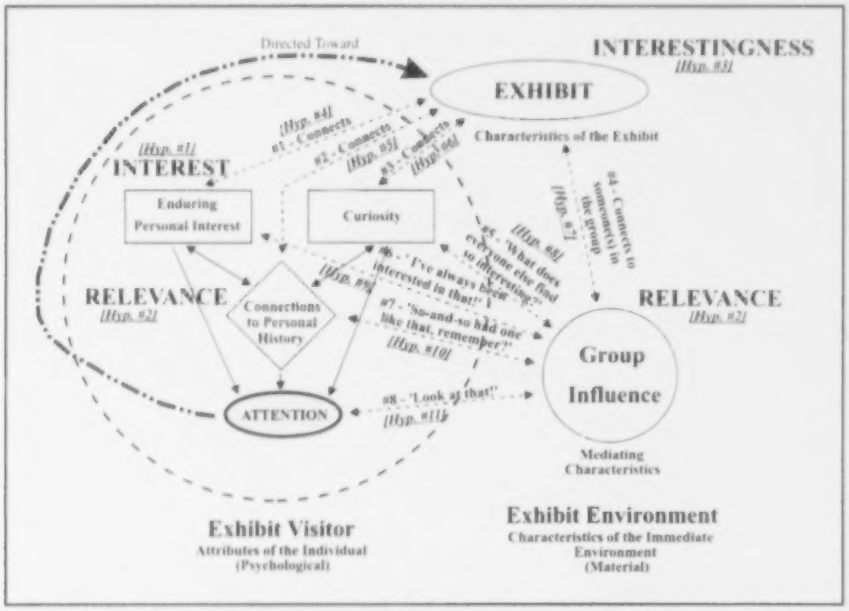

Figure 6 Attention Model with References to Hypotheses

Hypothesis #1 - **INTEREST** [Concept Level - Within Visitor]

The visitor's propensity to pay attention to an exhibit is influenced by the degree to which the exhibit or something in the exhibit environment appeals to the visitor's predisposition to expend attentional resources on the kinds of stimuli present. This predisposition is of two kinds: enduring personal interest or curiosity.

Conclusion: Visitors who have an enduring personal interest in some aspect of the exhibit or who's curiosity is aroused by elements in the exhibit or exhibit environment are more likely to pay attention to the exhibit than those who are unable to make either of these connections.

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Meaning for Museum: Many visitors need assistance in making connections to an exhibit. This is particularly true for an exhibit like the #1601 where the younger visitors are increasingly distanced from the railroad era. Interpretative aids that will assist them in making connections would be beneficial.

Example: Additional interest could be elicited by the use of a video, high-tech or low-tech interactive, or additional interpretative signs along the locomotive. These interventions should appeal to visitors' enduring personal interest and curiosity.

Suggestions for Research: Knowing how people develop an enduring personal interest in technological artifacts would be useful to the museum learning community. A study involving several technological exhibits should be undertaken to identify visitors who have enduring personal interest in those artifacts and to determine the genesis of that interest. Such a study would look for both commonalities and differences.

Hypothesis #2 - **RELEVANCE** [Concept Level - Within Visitor and Group Mediated]

The visitor's propensity to pay attention to an exhibit is influenced by the degree to which the exhibit or something in the exhibit environment is perceived to be relevant to the visitor. This perceived relevance is of two kinds: connections to personal history (within visitor) and group influence (group mediated).

Conclusion: Visitors who can make personal connections to the exhibit or who are assisted in making such connections by other members of their visiting group are more likely to pay attention than visitors who do not see any personal relevance in the exhibit.

Meaning for Museum: Visitors should be assisted in making their exhibit experience a personal one. The visit will be more memorable as a result and the visitor will be more likely to pursue additional learning outside the museum.

Example: Museum interpretation could provide a map of trackage where the 1600-class locomotives worked during the 1940s. Additional interpretation concerning it's builder--Lima Locomotive Works--could be provided. It might include builder's photos and information about other railroads that used Lima locomotives. The idea is to involve the greatest number of geographic areas and, hence, the greatest number of visitors.

Suggestions for Research: It would be useful to know more about how people make connections between the exhibit and their personal history. In addition, it would be helpful to know more about how those connections might facilitate learning both within the museum as well as learning that occurs long after the visit has concluded. This work would be very powerful in understanding the ability of a museum visit to inspire later learning.

Hypothesis #3 - **INTERESTINGNESS** [Environmental Factor Related to the Physical Exhibit]

The exhibit itself has inherent characteristics that influence its interestingness. That is, certain characteristics of the exhibit are likely to appeal to most visitors. Exhibits that have components that are deemed 'interesting' by average visitors have more power to connect to the elements of the attention model than do exhibits that have fewer of these intrinsic characteristics and are, thus, less likely to connect.

Conclusion: Visitors are more likely to attend to exhibits having universal characteristics. This is related to the psychological construct of curiosity but is a characteristic of the exhibit.

Meaning for Museum: The museum should capitalize on their exhibits that have the characteristics of interestingness and uniqueness. Not all exhibits are so endowed. Those exhibits that are unique technological artifacts present opportunities for visitors to connect to the characteristics of interestingness and uniqueness and, thus, present opportunities to achieve important learning goals.

Example: The sublime characteristics of the exhibit could be used to focus attention on other characteristics of the artifact. In the case of the #1601, its ability to conquer time and distance with heavy freight trains could become the entrée to move the visitor's attention from the sheer mass of the locomotive to aspects of coal mining and, ultimately, to important lessons on energy and the efficient use of fossil fuels. (See Hypothesis #1 - INTEREST. Interestingness is related to curiosity, an element of interest.)

Suggestions for Research: This element of interestingness remains a bit vague. Additional research should be conducted to determine what makes an exhibit interesting to average visitors and to tease out how interestingness is an exhibit characteristic rather than just another facet of the psychological characteristic of curiosity.

Hypothesis #4 - **Path #1 EDNURING PERSONAL INTEREST** [Connection #1, between Visitor and Exhibit]

Visitors may make a connection to the exhibit if they have a previously developed interest in the subject of the exhibit, one of its components, or if something in the exhibit environment appeals to an already developed interest. This element is subordinate to the category of interest.

Conclusion: Visitors are more likely to pay attention to exhibits representing topics in which they have already developed an ongoing or enduring personal interest.

Meaning for Museum: Visitors may not realize that a topic of enduring personal interest to them is embedded within a particular exhibit. Someone might have an interest in labor issues, for example, and may need assistance in connecting a steam locomotive with their interest. Appropriate interpretation would assist individuals with a variety of interests to make their own connections with the exhibit.

Example: Interpretation should include references to many different topics, such as: the social impact of railroads, related technologies and industries, political issues, and economics, among others.

Suggestions for Research: Knowing how people develop an enduring personal interest in technological artifacts would be useful to the museum learning community. A study involving several technological exhibits should be undertaken to identify visitors who have enduring personal interest in those artifacts and to determine the genesis of that interest. Such a study would look for both commonalities and differences. (See Hypothesis #1.)

Hypothesis #5 - **Path #2 CONNECTIONS TO PERSONAL HISTORY** [Connection #2, between Visitor and Exhibit]

Visitors may make a connection to the exhibit if they can see some relationships between the subject of the exhibit, or something in the exhibit environment, and their own personal history. This element is subordinate to the category of relevance.

Conclusion: Visitors are more likely to pay attention to exhibits representing topics that have some connection in their own personal history.

Meaning for Museum: People often need assistance in making connections between exhibits and their own personal history (See Hypothesis #1 for a similar concern). These

connections to personal history can occur more often if interpretative aids are incorporated within the exhibit that will facilitate this making of connections.

Example: Visitors with coal mining history from family or friends are more likely to connect if the map mentioned under Hypothesis #2 included the names and locations of mines whose coal was hauled by the 1600s. These visitors would be interested in seeing if they recognized the mines or regions and would think about whether they had any personal connections to any of the areas.

Suggestions for Research: I am speculating that different people view their personal histories quite differently. It would be useful to investigate these different perceptions of personal history in order to obtain a better idea of how people make connections between technological artifacts and their own lives.

Hypothesis #6 - **Path #3 CURIOSITY** [Connection #3, between Visitor and Exhibit]

Visitors may make a connection to the exhibit if there is some element inherent in the exhibit or the exhibit environment that elicits their curiosity. This element is subordinate to the category of interest.

Conclusion: Visitors are more likely to pay attention to exhibits that pique their curiosity.

Meaning for Museum: Installation of interpretative aids that appeal to visitors' curiosity would be of immense benefit in causing people to pay attention to the exhibit. It is a clear outcome of this study that curiosity is the most prevalent element of the model in the exhibit studied. Use of this element is likely to be the single most effective way of motivating the attention of visitors. Sights, sounds, and smells are also ways of drawing people to the exhibit through the element of curiosity.

Example: The use of questions in the interventions mentioned in the other examples in this section would enhance the appeal to visitors' curiosity.

Suggestions for Research: Much is already known about curiosity and this study has clearly demonstrated the possible role of curiosity as a motivator to attention. But we still know little about how this initial motivator translates into learning outcomes. Research that investigates this connection would strengthen the argument for capitalizing on the natural propensity for humans to satiate aroused curiosity.

Hypothesis #7 - **Path #4** [Connection to another Group Member]

A particular exhibit may not connect directly to a particular visitor but may make one of the connections described in mediation paths #1 through #3 (Hypothesis #4 through #6), i.e., through enduring personal interest, connections to personal history, or curiosity, to another individual in the visitor's group. This individual within the group may then assist the visitor to pay attention by mediating between his or her own connection and the non-attending group mate. This leads to the connections described by paths #5 through #7 (Hypothesis #8 through #10). The attending individual in the group may also assist his or her group mate to attend by merely pointing out something in the exhibit and saying, "Look at that [directing their group mate to a specific element]!" This specific directing behavior is described in mediation path #8 (Hypothesis #11). The group influence element is subordinate to the category of relevance but may result in attentional behaviors through elements subordinate to either interest or relevance.

Conclusion: Visitors within groups may not be able to make connections to the exhibit unassisted. Instead, attention may result from the mediating activities of other group members.

Meaning for Museum: Visitors are most likely to come in groups rather than alone. This study, for example, did not encounter any solo visitors either amongst those interviewed or those I observed but did not interview. Appealing to groups is, therefore, an important consideration for the museum. Exhibits that make such group appeals are more likely to connect to individual visitors and achieve specific educational outcomes. The visiting group holds great promise for connecting visitors to exhibits.

Example: Any interpretation should include some activity that would promote group interaction. In the case of the #1601 groups could engage in a 'scavenger hunt,' being challenged to find things on the locomotive or to answer questions about the locomotive.

Suggestions for Research: Many museum researchers are now pursuing research agendas involving family groups. Additional research that further investigates how family and social group influence affects learning, both within the museum and after the visit, should be conducted. The results of these research efforts should also be connected to the attention model.

Hypothesis #8 - **Path #5** [Group Influence via Curiosity]

Visitors within a group may become curious to know why others find the exhibit so interesting. These visitors might wish to discover what others are paying attention to and, in so doing, begin paying attention themselves. This curiosity is subordinate to the category of interest.

Conclusion: Visitors are more likely to pay attention to exhibits if other members of their group exhibit attending behaviors.

Meaning for Museum: A non-attending visitor may be motivated to attend if only one individual within the group makes a connection. Interpretation that builds upon the element of

curiosity would be helpful in getting a larger number of the members of a visiting group involved with the exhibit.

Example: The use of questions in the interventions mentioned in the other examples in this section would enhance the appeal to visitors' curiosity. Any interpretation should include some activity that would promote group interaction. In the case of the #1601 groups could engage in a 'scavenger hunt,' being challenged to find things on the locomotive or to answer questions about the locomotive. (See Hypotheses #6 and #7.)

Suggestions for Research: A possible question for future research is: Does an attending group member hold the power to influence a non-attending group member to attend and what is the nature of this influence? For this path, this means that the non-attender begins to investigate the exhibit merely because of the need to satiate his or her curiosity about the attention paid the exhibit by group mates.

Hypothesis #9 - **Path #6** [Group Influence via Enduring Personal Interest]

Visitors within a group may become interested in an exhibit if someone in their group has an enduring personal interest in the exhibit or one of its elements. Such an attending group member may mediate the attention of group mates by saying, "I've always been interested in that [mentioning the specific]." The non-attending group member may thus be drawn into a dialogue that results in the previously non-attending group member paying attention. This interaction might lead to an emerging interest that is subordinate to the category of interest.

Conclusion: Visitors are more likely to pay attention to the exhibit if they are in a group that has other members with an enduring personal interest in the exhibit or one of its elements.

Meaning for Museum: Group members who do make a connection with the exhibit--such as an enduring personal interest--might be more likely to mediate verbally with non-attending group mates if the interpretation is designed to facilitate conversation.

Example: Interpretation should include references to many different topics, such as: the social impact of railroads, related technologies and industries, political issues, and economics, among others. Any interpretation should include some activity that would promote group interaction. In the case of the #1601 groups could engage in a 'scavenger hunt,' being challenged to find things on the locomotive or to answer questions about the locomotive. (See Hypotheses #4 and #7.)

Suggestions for Research: Museum educators would like to know how group members are motivated to share their personal interests with others within their visiting group and what learning outcomes are realized by this kind of group mediation.

Hypothesis #10 - **Path #7** [Group Influence via Connections to Personal History]

Visitors within a group may become interested in an exhibit if someone in their group makes a connection to personal history through the exhibit or one of its elements. Such an attending group member may mediate the attention of his or her group mates by making a comment about that connection, possibly relating it to a shared experience that the previously non-attending member may also share but had not thought of. The non-attending group member may thus be drawn into a dialogue that results in that group member paying attention. This interaction may lead to a connection to personal history that is subordinate to the category of relevance.

Conclusion: Visitors are more likely to pay attention to the exhibit if they are in a group that has other members with a connection to personal history that is brought to the fore by the exhibit or one of its elements.

Meaning for Museum: People often need assistance in making connections between exhibits and their own personal history (See Hypothesis #1 for a similar concern). These connections to personal history can occur more often if interpretative aids are incorporated within the exhibit that will facilitate this making of connections. (See Hypothesis #5.)

Example: Visitors with coal mining history from family or friends are more likely to connect if the map mentioned under Hypothesis #2 included the names and locations of mines whose coal was hauled by the 1600s. These visitors would be interested in seeing if they recognized the mines or regions and would think about whether they had any personal connections to any of the areas. Any interpretation should include some activity that would promote group interaction. In the case of the #1601 groups could engage in a 'scavenger hunt,' being challenged to find things on the locomotive or to answer questions about the locomotive. (See Hypotheses #5 and #7.)

Suggestions for Research: I am speculating that different people view their personal histories quite differently. It would be useful to investigate these different perceptions of personal history in order to obtain a better idea of how people make connections between technological artifacts and their own lives. (See Hypothesis #5.)

Hypothesis #11 - **Path #8** [Group Influence via Direct Appeal]

Visitors within a group may become interested in an exhibit if someone in their group directs their attention to the exhibit or to one of its elements. This element is subordinate to the category of relevance.

Conclusion: Visitors are more likely to pay attention to the exhibit if they are directed by another group member to look at the exhibit or one of its elements.

Meaning for Museum: The museum should capitalize on their exhibits that have the characteristics of interestingness and uniqueness. Not all exhibits are so endowed. Those exhibits that are unique technological artifacts present opportunities for visitors to connect to the characteristics of interestingness and uniqueness and, thus, present opportunities to achieve important learning goals. Visitors who come in groups have additional opportunity to discuss these elements with their group mates. (See Hypothesis #3.)

Example: Any interpretation that involves the visitor with specific characteristics of the locomotive can result in this connection. A visitor engaged in such an activity--like the scavenger hunt--might find something and direct a group mate to look at it.

Suggestions for Research: This element of interestingness remains a bit vague. Additional research should be conducted to determine what makes an exhibit interesting to average visitors and to tease out how interestingness is an exhibit characteristic rather than just another facet of the psychological characteristic of curiosity. Also of interest is how this element is approached by groups of visitors. How does group response erupt? Does it involve every member of the group? (See Hypothesis #3.)

GROUP INFLUENCE - Some Variations

The group influence element operated a bit differently for some of the groups within this study than I had originally expected. This element was initially thought to occur only when the group was physically located within the exhibit environment. The groups in this study showed, however, that the group influence element was more flexible than the original conceptualization allowed.

Group #5 is a good example of this phenomenon. This group made their decision to come to the #1601 exhibit after entering the museum and reviewing the map provided to them at the entrance. They made their shared decision to come to the exhibit upon seeing the railroad section shown on the map. This was mediated by a connection to personal history on the part of the grandparents in the group.

This oversight is not really a deficiency in the model. Instead, it is an oversight in the conceptualization about how the model functions. Certainly the notation of a locomotive/railroad exhibit on the map may well have the power to make the same connections as the exhibit itself to those individuals within the group who have an affinity for the topic/content of the exhibit. The group influence element was conceptualized as it was under the assumption that the three dimensional exhibit had more power to attract attention than did any two-dimensional representations of it.

Conclusion: The group influence element has the power to describe the motivation to attend at several levels. Not only can it describe the prerequisites to attention when the group is within the exhibit environment, but it can describe the prerequisites when the group is planning their visit with the aid of the map provided at the entrance to the museum.

Meaning for Museum: Printed materials distributed to visitors--particularly the map--play important roles in how some visiting groups make decisions concerning their museum visit. Printed materials may draw some groups to particular exhibits if they are adequately descriptive.

Example: Be sure that exhibits that represent learning goals that are important to the museum are prominently featured on the map and in other literature.

Suggestions for Research: I would suggest research on the role of the printed matter, such as maps, in motivating attention and, ultimately, learning. (Suggestions for group influence within the exhibit environment have already been forwarded in Hypotheses #7 through #11.)

GROUP #9 - Least Involved

Group #9 appeared to be the least affected by the elements of the attention model than any of the other groups in this study. This may be reflected by their lack of an agenda for their visit. In the words of the father, "We're just goin' around the building."

The exhibit did, however, elicit some level of curiosity. Again, in the words of the father, "I thought how huge it was--massive. And how complicated it must have been, back at that time, to design and build something like that." He also said, "Certainly like to climb up in it and drive that thing."

This group is surely representative of how any one group might approach a specific exhibit. That is, disallowing enduring personal interest, connections to personal history, or group influence, the only connection left might be through the interaction of curiosity and interestingness.

Conclusion: Even superficial curiosity can result in attention. The path through the attention model was simpler for this group than the other groups. However, the attention model was still able to explain the reason for the brief attention paid the exhibit by this father and son.

Meaning for Museum: The museum can capitalize on this transient attention by providing additional information in the exhibit environment that might take a group like this one beyond their initial superficial curiosity to a deeper level of involvement with the exhibit. Such additional involvement might result in at least partial attainment of the museum's learning goals for the exhibit.

Example: It is quite likely that any one of the several examples given in this chapter for putting theory into practice would help groups like this one connect. (See hypotheses #1 through #11.)

Suggestions for Research: It would be useful to conduct a study using groups that are only paying superficial attention to the exhibit. Such a study should investigate the reason for the relatively shallow attention and what could be done to take the group beyond the superficial to at least the partial realization of the museum's goals for the exhibit.

A WARNING

From the foregoing it would appear that the curiosity-interestingness connection could become a panacea. Curiosity was the route chosen by Csikszentmihalyi and Hermanson for their model (Figure 1) as a possible entrée into the Flow experience. It is indeed likely that curiosity is the path of least resistance but one wonders if this easy path results in the kinds of learning outcomes that the museum is seeking. This curiosity-interestingness connection is a strong one

but we are still uncertain as to what kind of learning is taking place, if any. It would seem to be well worth the time and expense to implement all paths/connections from the attention model in order to achieve a balance between mere visceral connections and more meaningful ones. This is a void that can be filled by future research.

WHAT THE PATHS MEAN

People pay attention to an exhibit because they either find it interesting or see connections between what the artifact represents and their own lives; they see a relevance. They pay attention because they have already developed an interest in the artifact or topics related to it; because their curiosity has been aroused by the exhibit, one of its elements, or something in the exhibit environment; or because of some inherently interesting characteristic of the exhibit.

People find the exhibit relevant when they can make a connection to their own lives. This may be a connection to personal history, when they can remember incidents in their lives or a relative's or friend's life that makes the exhibit personal. It can also occur when other members of their visiting group find their own connections and share them with other group members in a variety of ways.

In short, people pay attention when they find one of several ways that the exhibit is meaningful to themselves.

SUMMARY

The attention model for museum exhibits appears to have a good future in museum studies on learning in exhibits. Future research, as suggested above, will result in assuring the model's role in theory building as well as in the practice of exhibit design

Attention is a prerequisite for learning, and learning is a common goal for museum exhibits. We will better understand how attention is gained as we advance our research agenda based on the attention model. Additional knowledge of museum learning can then be moved forward once research on attention is available to build upon. This study has provided a model that can become the basis for this advance in knowledge of museum learning.

This research was born out of a dissatisfaction with Csikszentmihalyi's and Hermanson's 'hook.' Their hook was too simple to describe the complexities of motivating a visitor's attention. The attention model for museum exhibits was developed through the literature and put to the test with fourteen groups who visited the C & O #1601. In the final analysis the model does appear to be a plausible representation of the phenomenon under study--motivation to attend.

There are many ways that lead to getting a person to pay attention. All of them come at a cost. But if we are to persuade visitors to allocate scarce attentional resources, we must be willing to intervene through thoughtful interpretation of artifacts. To some visitors the connections will be obvious, and our interventions will not need to be as aggressive, while the vast majority will likely only be convinced to attend to the extent that we can quickly prove to them that their attention will be well spent with a particular exhibit.

The following points summarize the conclusions of this study:

- ✔ The evidence from this study suggests that the attention model for museum exhibits is a plausible explanation about how visitors pay attention in a museum.

- ✔ The findings lend support for the hypothesis that interest and relevance categorize the motivation that precedes attention.

- ✔ This study also demonstrates that it is reasonable to hypothesize that subordinate elements of enduring personal interest, curiosity, connections to personal history, group influence, and the interestingness of the exhibit influence attention.

- ✔ The attention model is a viable replacement for the 'hook' in Csikszentmihalyi's and Hermanson's model.

- ✔ The attention model is able to describe the visits of specialized groups, such as stories one through three, or to describe the visit of a more general family/social group, such as story number four.

- ✔ People visiting the C&O #1601 didn't all attend in the same way but the model had the flexibility and power to describe motivation to attention in each case.

- ✔ The attention model will be useful in guiding future research as well as museum practice.

- ✔ The attention model marks a firm beginning for the conduct of academic research in museums.

NOTES

1. QSR is Qualitative Solutions and Research of Victoria, Australia. NUD*IST® stands for **N**on-numerical **U**nstructured **D**ata **I**ndexing, **S**earching, and **T**heorizing.

2. Within the visitor relevance is Connections to Personal History. From the environment, relevance is a function of the Group. As discussed on p. 21, the individuals in the group act like components of a single visitor, thus making this connection a strong one.

3. Named for the Allegheny Subdivision of the Chesapeake & Ohio Railroad.

4. This is the Whyte system of locomotive classification. In 2-6-6-6, the first number indicates the number of wheels on the pilot truck that guides the locomotive around curves; the middle numbers refer to the number of powered wheels (the Allegheny was a 'simple articulated' in that it had two sets of engines under the one boiler, thus it had two groups of six driving wheels); the last number indicates the number of wheels in the trailing truck; the Allegheny required so many because of the large grate area, 135.2 square feet.

5. The Alleghenies also saw regular service in moving heavy passenger trains over the mountain routes.

6. Attentional behaviors included looking at the locomotive, pointing at the locomotive, groups stopping to talk amongst themselves, looking at the label, looking at the picture of the cab interior, and similar behaviors that had the potential to indicate a focusing of psychic energies on the artifact.

7. The Universal Resource Locator (URL) for the QSR web page is: http://www.qsr.com.au

8. The museum might consider using a model to help visitors gain a perspective on a machine this large. The recent issue by River Raisin Models (Appendix G, Photo 2) might be located in a display case about half-way back on the right-hand side of the locomotive to serve this purpose.

9. "Plausibility" is used in this paper in Bruner's (1990) sense as he asks, "Are not plausible interpretations preferable to causal explanations, particularly when the achievement of a causal explanation forces us to artificialize what we are studying to a point almost beyond recognition as representative of human life?" (p. xiii).

10. Flow is Csikszentmihalyi's construction of intrinsic motivation. It assumes that the experience becomes so engrossing that one just flows along, losing all track of time, etc. (See Csikszentmihalyi, 1975, 1990).

APPENDICES

APPENDIX A

APPENDIX A

Original Interview Questions

Questions

1. Why did you choose to stop and look at this locomotive?

   FU1. Why did what you saw/heard draw you here?

   FU2a. What is it about locomotives (or trains or railroads) that has always interested you?

   FU2b. Could you describe those memories?

   FU2c. In what way was your curiosity piqued?

2. Tell me what you looked at?

   FU1. Why did you look at those things?

   FU2a. Does that relate in any way to your longstanding interest in locomotives?

   FU2b. Does that relate in any way to the memories that you mentioned?

   FU2c. How did that arouse your curiosity?

3. I noticed that you stopped near the ... [name spot]. Why did you stop there?

   FU1. What were you thinking (or talking) about?

4. What emotions did you experience when you looked at this locomotive? That is, how did it make you feel?

For groups, also ask:

5. Would any of you have stopped at this exhibit if you weren't in this group? Why (not)?

6. Who directed the group over to this exhibit? Why did you direct them here? Why did everyone come?

7. For those who wouldn't have normally stopped, why would you have gone to another exhibit? Did this exhibit prove satisfying after you got here?

General/Miscellaneous:

8. If you had to describe this locomotive to a friend, what would you tell them?

9. If there was an expert present here today, what would you want to ask about this locomotive?

10. What do you feel the museum could do to help people better understand this exhibit?

Note: All questions will be followed-up with an eye for the major constructs driving this research. The plan is to go from the general to the specific without giving the visitor any tips on how I might want particular questions answered. Much of the questioning will be spontaneous, based on the responses from visitors.

APPENDIX B

APPENDIX B

Revised Interview Guide

Why did you choose to stop at this exhibit today?
Did you see, smell, or hear anything that attracted you?
Did any one individual in the group steer the group over here?

What were you thinking about as you looked at the locomotive?
Did any particular memories occur to you?
How did you feel as you looked? Did looking at the locomotive evoke any emotions?

Please tell me what you looked at?
Why did you look at those things?
Were those thing meaningful in any way (evoke memories, associations, etc.)?

I noticed that you stopped [named a few places where I saw them stop]**. What were you thinking/talking about?**

Do you have any railroad memories from friends, relatives, or personal experience?

Do you consider yourself to have any longstanding interest in locomotives?
How did that come about?
What is something else that you're very interested in?
How did that interest come about?

Do you have a friend or acquaintance who would be interested in this locomotive? Why do you think they would be interested?

If you were to tell a friend about your visit to this locomotive, what would you tell them?

If there were an expert present here today, what would you like to ask about this locomotive?

What do you feel the museum could do to help people better understand this exhibit?

NOTE: On March 1, visitors were also asked if they were in town for the railroad memorabilia sale at St. Martha's that would be taking place the following day. If so, this would predispose them to be interested in locomotives, biasing the results.

Also on March 1, visitors were asked if they were in town for the SAE Convention, just concluding. Two groups were found to be in this category. It was assumed, however, that this would not bias the results since they were not particularly interested in locomotives in a direct way.

APPENDIX C

APPENDIX C

Informed Consent Information

Introduction

Hello, I noticed that you spent some time looking at this locomotive. My name is John Lightner and I'm a graduate student at Michigan State University and I'm talking with visitors today in order to gather data for a study on learning in museums.

I will try to take no more of your time than necessary. The information that you share with me will be of assistance to both my own work and to the museum.

My study is concerned with what attracts visitors to a particular exhibit and what the dynamics of that motivation are. Your information about your encounter with the locomotive will help me develop an attention model for museum exhibits. This work will be written up in partial fulfillment of my program requirements at the university. In addition, I will be submitting articles to one or two journals that print articles on this subject. I am also planning to make a presentation at the Visitor Studies Conference in Atlanta later this year.

The museum staff will also receive a report that will help them as they plan for the improvement of their exhibit.

DO YOU HAVE ANY QUESTIONS CONCERNING THE PURPOSE FOR THE INTERVIEW?

You need not answer any question that you choose not to and you may terminate the interview at any time you choose.

I would ask your permission to audio tape our conversation for note taking purposes and to save some time. Would that be acceptable?

The recordings will be transcribed and I may use a direct quote when writing the results of this study. I will not have any way of identifying you by name since I have not asked your name. Such quotes will be attributed to an exhibit visitor and possibly given a pseudonym, a made-up name.

You are indicating your **voluntary agreement to participate** by continuing with the interview.

[If a group has no minor children present]

Any individual may answer any specific question or several of you may choose to respond. I am seeking the best group consensus we can get in the time we have, so please add anything you feel should be said.

Do you have any questions before we start? Let's begin.

[If there is a question of whether any members are minors]

Is anyone in the group under 18-years of age?

[If a group clearly has minors present]

Who is the parent or guardian of the children in the group? Do you give your voluntary consent for the children to participate in the interview? [Directed to the children] Are you willing to participate?

As I ask questions I will ask the younger members of the group to respond first, others may answer next. Any individual may answer any specific question or several of you may choose to respond. I am seeking the best consensus we can get in the time we have, so please add anything you feel should be said.

Do you have any questions before we start? Let's begin.

APPENDIX D

APPENDIX D

Informed Consent Letter

MICHIGAN STATE UNIVERSITY

College of Education • Department of Counseling, Educational Psychology and Special Education

East Lansing • Michigan • 48824-1034

1 October 1996

Dear Museum Visitor:

This study is concerned with what attracts visitors to a particular exhibit and what the dynamics of that motivation are. My work is concerned with the development of an attention model for museum exhibits. This work will be written up in partial fulfillment of my program requirements at the university. In addition, I will be submitting articles to one or two journals that print articles on this subject as well as making a presentation at the Visitor Studies Conference in Atlanta, next year. The museum staff will also receive a report that will help them as they plan for the improvement of their exhibit.

Our conversation was audio taped for note taking purposes, per your consent. The recordings will be transcribed and I reserve the right to use a direct quote when writing the results of this study; quotes will be attributed generically to an "exhibit visitor." These tapes will be kept in a locked file cabinet in my office.

Your anonymity is guaranteed in that I have not asked you to reveal your name. Likewise the information you shared will be kept in confidence and only shared in the ways I have described in the previous paragraphs, attributing the statements used to an exhibit visitor.

As we agreed at the beginning of the interview, your willingness to continue constitutes your informed consent, that is, that you are willing to continue in light of your understanding of the use to which the information would be put.

Should you wish to contact me, you may do so at Michigan State University. A phone number in the Educational Psychology Department is: 517/355-6684.

Thank you for your assistance in this project.

Very truly yours,

John W. Lightner

MSU is an Affirmative Action Equal Opportunity Institution

APPENDIX E

APPENDIX E

Complementary Bookmark

CHESAPEAKE & OHIO

locomotive #1601

Type: H-8 (Allegheny), Built: December, 1941
Builder: Lima Locomotive Works, Lima, Ohio

Located At: **Henry Ford Museum**, Dearborn, MI

Front side of complementary bookmark.

Boiler Pressure: 260 psi
Cylinders (dia. x stroke): (4) 22 ½" x 33"
Piston Valve (max. travel x dia.): 8" x 12"
Driver Diameter: 67"
Weight (loco. + tender): 1,215,600#
Length: 125' 8"
Width: 11'1"
Height (top of stack): 16' 5 ½"

Wheel Arrangement: 2-6-6-6
Tender: 25 tons, coal
25,000 gal., water
426,100#
Cost: $230,663 (in 1941)
Tractive Force: 110,200#
Tubes (# & dia.): 48 - 2 1/4"
Flues (# & dia.): 278 - 3 ½"

Back side of complementary bookmark.

Note: The bookmark is shown actual size. It was printed on a medium blue card stock. The information is from Huddleston & Dixon, Jr. (1996).

APPENDIX F

APPENDIX F

Node Names

NODE IDENTIFIER	NODE NAME
F1	Enduring Personal Interest
F2	Curiosity
F3	Connections to Personal History
F4	Interestingness
F5	Group Influence
F6	Sublimity
F7	New Interest
F8	Personal Limitations
F9	Better Interpretation
F10	Extended Attention
F11	Uniqueness
F12	Museum Experience
F13	Repeat Visit
F14	Imaginings
F15	Nostalgia

APPENDIX G

APPENDIX G

C&O #1601 Images

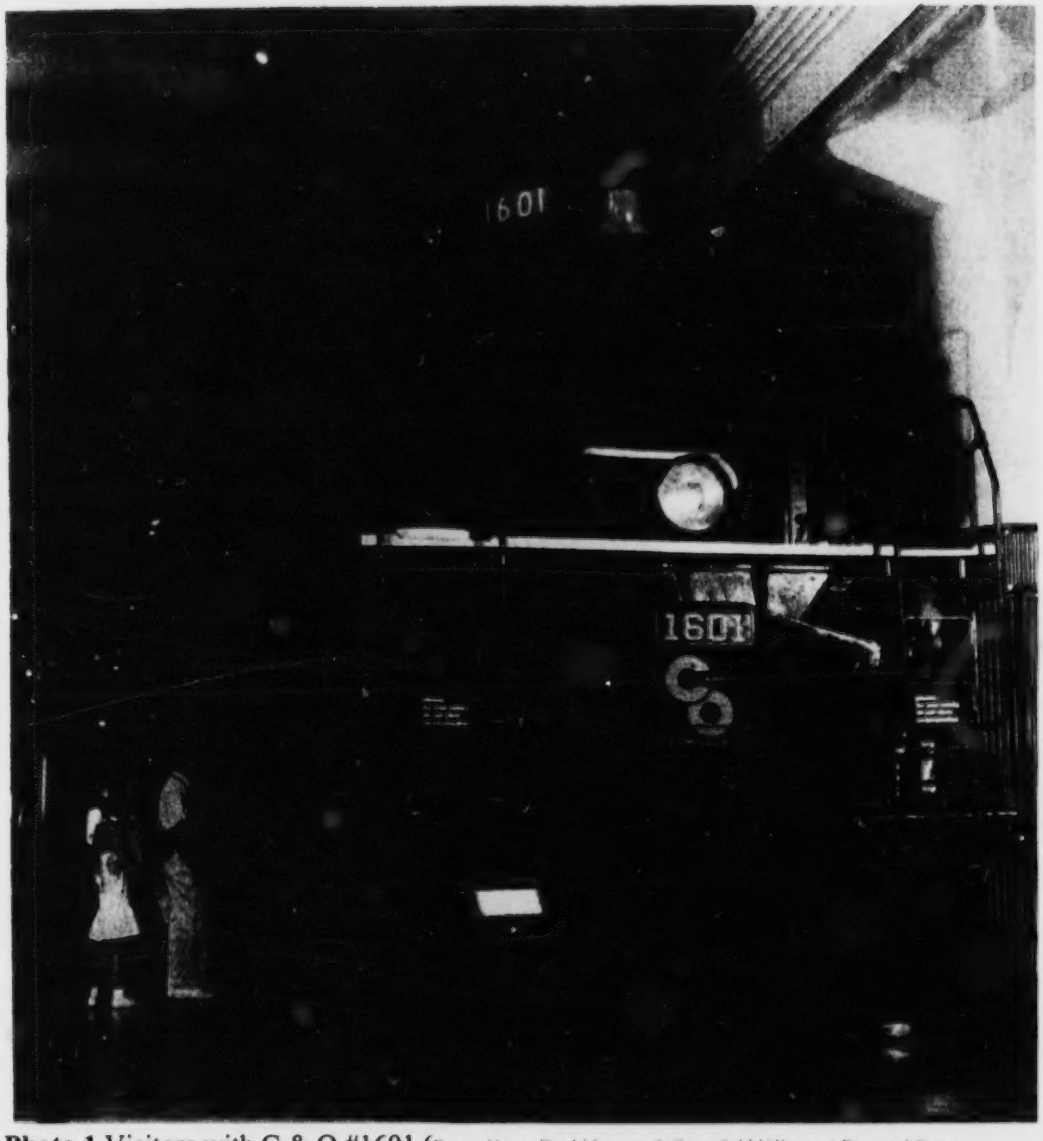
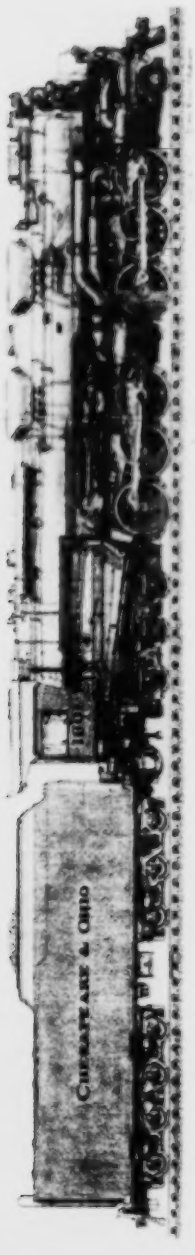


Photo 1 Visitors with C & O #1601 (From: *Henry Ford Museum & Greenfield Village: A Pictorial Souvenir*, 1993).

BEST COPY AVAILABLE



Drawing 1 Profile of C & O #1601
(Bill Berkompass, artist. Used with permission of Technical Press, Ltd.)

BEST COPY AVAILABLE

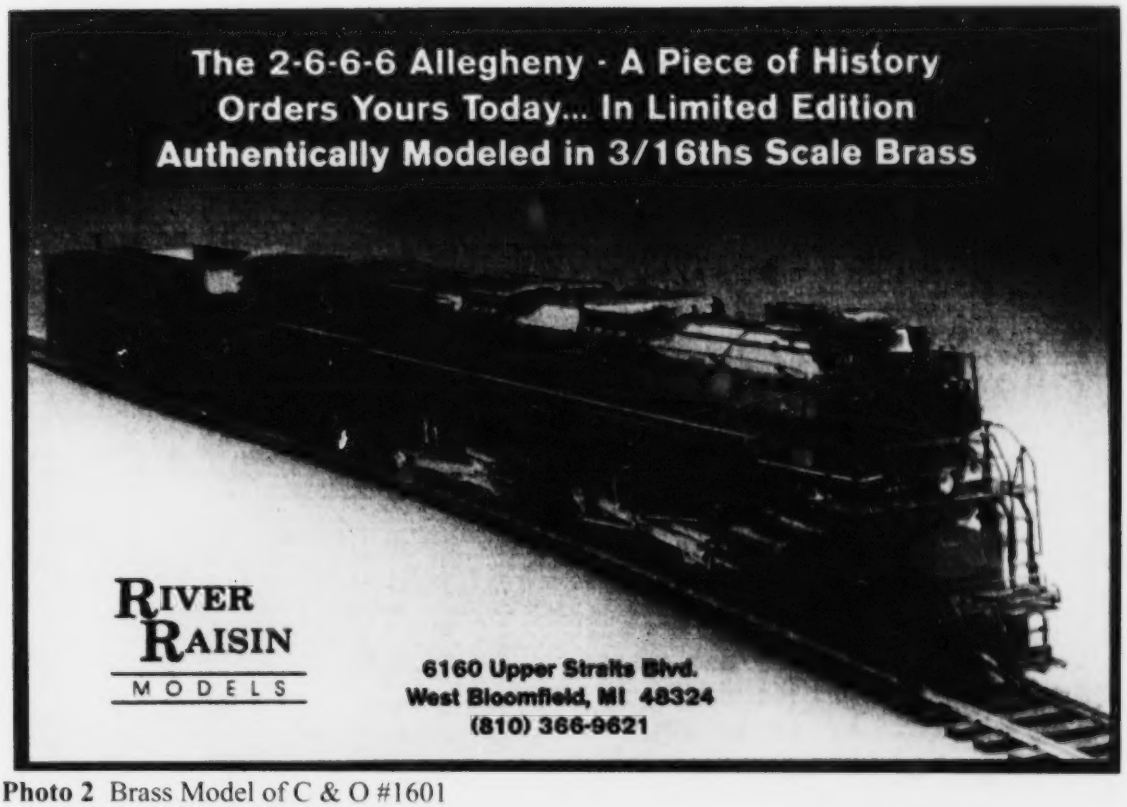

The 2-6-6-6 Allegheny · A Piece of History
Orders Yours Today... In Limited Edition
Authentically Modeled in 3/16ths Scale Brass
RIVER RAISIN
MODELS
6160 Upper Straits Blvd.
West Bloomfield, MI 48324
(810) 366-9621

Photo 2 Brass Model of C & O #1601

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